Sun StorEdge™ 3511 FC Array with SATA Just the Facts

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Figure 1. The Sun StorEdge™ 3511 Fibre Channel Array with SATA

Introduction

Introducing the Sun StorEdge™ 3511 FC array with SATA, the latest offering in the Sun StorEdge 3000 family. The StorEdge 3511 FC array supports SATA disks and is based upon Fibre Channel to Serial ATA RAID technology providing low cost, high capacity storage while preserving the enterprise class benefits of the Sun StorEdge 3500 series.

Customers of Sun's server products should find the Sun StorEdge 3511 FC Fibre Channel array an excellent storage complement to IT infrastructures requiring either multiple classes (price/performance) of storage solutions or for streaming-focused applications. Thus Sun StorEdge 3511 FC Array with SATA is well suited for cost sensitive environments with Sun Servers, such as:

- Data Lifecycle Management (DLM)
- Content Addressable Storage (CAS)
- Disk to disk backup and restore
- Secondary SAN storage
- Near-line DAS storage
- Static reference data storage

Key technical highlights of the Sun StorEdge 3511 Fibre Channel array with SATA include:

- Available with a single RAID controller, dual redundant RAID controllers, or as an expansion unit, all in a 2U high (3.5-inch) chassis
- Four 2-Gb FC host ports per RAID controller, resulting in eight host ports in dual RAID controller configurations
- Servers can be directly attached to arrays without requiring external switches
- Up to five Sun StorEdge 3511 Fibre Channel array with SATA storage expansion units can be attached to a single RAID array, for a total raw storage capacity of 18TB (using 250GB drives)
- In-band management through FC host connection or out-of-band management via serial or Ethernet connections
- Menu-driven VT100 terminal interface for efficient configuration control

- CLI for scripting control
- Intuitive, simple setup and management; single management GUI provides intuitive RAID and LUN configuration for every array in the environment
- Support for up to 1024 LUNs private or public loop and 64 LUNs in point to point/full fabric mode (in both single and dual RAID controller configurations)
- Support for Sun SAN 4.1
- Dual redundant, hot-swappable power supplies (AC or DC options)
- Full NEBS level 3 certification and MIL-STD-810F compliance for air, land, and marine deployment

Key Features

The initial release of the Sun StorEdge 3511 FC Array includes the following features:

Feature	Specifications
Host Interface	2-Gb Fibre Channel
Number of Host Interfaces	Single controller: four FC ports for host connectivity Dual controller: eight FC ports for host connectivity Expansion: four FC ports for disk connectivity
Number of Drives	Per controller tray: 12 hot-swappable Per expansion tray: 12 hot-swappable Per single system: 72 hot-swappable (6 arrays x 12 drives)
Rack Height of Tray	2U
Drive Midplane	Dual-ported Serial ATA
RAID Options	Single controller or dual redundant controllers
RAID Level Support	RAID 0, 1, 1+0, 3, 5, 3+0, and 5+0 Supports global hot-sparing where applicable
Power and Cooling Options	100-240VAC at 50/60 Hz or -48VDC/-60VDC dual hot-swap/redundant Dual hot-swap/redundant fans (integrated with power supplies)
RAID Controller	1-GB cache per controller; cache battery backup module; six FC ports per controller; hot-swap redundant mirrorable configuration (paired controllers); 1024 LUNs private loop DAS or public loop fabric/switch enabled , 64 LUNs point to point/full fabric per array; 256 command tag queues (CTQs) per controller or controller pair
Daisy Chain Support	Yes, expansion units off of RAID controller equipped arrays
NEBS Compliance	Level 3 certified by Telcordia
MIL-STD Certification	MIL-STD-810F subset compliant for air, land, and marine applications

Additional features of the Sun StorEdge 3511 Fibre Channel array with SATA include the following:

- Density of 3.0-TB raw capacity in 2U format (with 250-GB drives)
- Redundant hot-swappable (FRUs)
- Mirrored cache RAID controller configuration
- Two power supplies, each with power inlet
- Two cooling fans integrated into each power and cooling unit FRU
- In-band and out-of-band host-based management
- Non-disruptive firmware upgrades (no downtime for firmware upgrades) in dual-controller RAID configuration
- Dynamic storage capacity expansion (DSCE) and dynamic LUN expansion (DLE)
- Event monitoring and reporting
- Component health monitoring including disk, power, thermal, fans, SES, and SMART-compliant in band and (except for expansion units) out of band

Product Family Placement

The Sun StorEdge 3511 Fibre Channel array with SATA is the latest product of the Sun StorEdge 3000 family and is positioned at the entry-level secondary storage market segment. Primary target markets include small- to medium-sized businesses, Linux and Windows environments, streaming applications, and ruggedized environments including the government and telecommunications industry. The Sun StorEdge 3511 Fibre Channel array with SATA meets the requirements of a wide range of secondary storage or streaming applications providing a powerful set of flexible and easy-to-use tools. With the Sun StorEdge 3511 Fibre Channel array with SATA, customers can pay for what they need today and can easily scale in capacity as their business grows providing compelling solutions for businesses and streaming applications. The Sun StorEdge 3511 Fibre Channel array with SATA is Telcordia certified and ruggedized for telecommunication, industrial, military, air, land, and marine applications.

Target Markets

Flexibility is a key selling featuring of the Sun StorEdge 3511 Fibre Channel array with SATA. The flexible architecture is primarily targeted at traditional small- to medium-sized deployments and business. However, the feature targets secondary storage applications and carrier-grade/telecommunications-hardened applications.

The Sun StorEdge 3511 Fibre Channel array with SATA is ideal for any environment where space is at a premium and FC flexibility is required. Customers should appreciate this array's outstanding versatility which combines enterprise-class high availability features, cost-sensitive environments, flexible configurability, easy-to-use common management options, remote control functionality, and a highly ruggedized package.

The most common applications for a Sun StorEdge 3511 Fibre Channel array with SATA include the following:

- Information Lifecycle Management
- Content Addressable Storage
- Backup and restore
- Secondary SAN storage
- Near-line DAS storage
- Static reference data storage

Selling Highlights

Market Value Proposition

The Sun StorEdge 3511 Fibre Channel array with SATA delivers a robust product with an open and flexible architecture featuring the combination of FC host connections and SATA disks. The features extend the capabilities of SANs and enable new, more cost-effective data management solutions without compromising key enterprise features, functionality, and reliability.

Key Features, Technical Functions, and Benefits

Feature	Function	Benefit
Up to 3 TB in a 2U high enclosure.	Supporting 54TB of storage per rack	High density with small footprint
NEBS Level 3 certified and MLI-STD-10F altitude, temperature, humidity, shock, vibration, and salt fog corrosion resistant compliant system.	Tested for ruggedness and meets a high standard for continuous operation through a wide variety of environmental extremes.	Carrier-grade array (Military standard enhanced) – offering customers increased reliability and assurance in their attempt at delivering higher levels of service to their customers.
Equipped with SATA disk drives	2 Gb/s Fibre Channel front-end to a SATA disk infrastructure	Excellent combination of high capacity with throughput and low-cost.
Redundant power supplies, fans and RAID controllers	Enhanced system availability. Monitors and reports power supply faults, fan failures and RAID controller errors	Provides continuous operation due to failed power supply, fan or RAID controller.
Hot-swappable drives, fans, power supplies and RAID controllers	Allows for on-line failed component replacement	Provides easy serviceability and continuous operation.
Terminal, GUI, Web interfaces for configuration and management.	Allows administrator to configure and manage through a variety of interfaces.	Provides greater flexibility for management/configuration purposes
Industry-standard rack/system cabinet mounting options	Universal 19” rack sliding rails, center post or four post option kits for wide mounting compatibility	Flexibility in fitting the Sun StorEdge 311 FC Array in a wide range of IT environments.
1024 LUN Support	Allows flexible LUN configurations within a single subsystem. 1024 LUNs using private and public loop attach, and 64 LUNs in fabric point to point	Provides more granularity and flexibility for host and application configurability.
Up to 5 expansion arrays	Daisy chain to multiple expansion units	Provides high density cost effective capacity within a rack

Support Information and System Requirements

Operating Environments

The following table lists the Operating Systems supported for hosts connected to the Sun StorEdge 3511 FC Array.

Supported Operating Systems	Notes and Requirements
Solaris™ 8 4/01 and Solaris 9 Operating Systems	Requires the appropriate version of the Solaris Operating System recommended patch cluster. Systems running the Solaris Operating System must have the Sun StorEdge SAN Foundation Kit (SFK) software installed. The SFK software includes required patches and drivers for the supported host adapters. The SFK software also includes the Sun StorEdge Traffic Manager software for the Solaris Operating System.
Solaris 9 OS x86 Platform Edition (9 4/04)	Sun StorEdge Configuration Service and CLI management interfaces for the StorEdge 3511 Fibre Channel array with SATA are fully supported with Solaris x86 and the latest patch-cluster. It is required to use the QLogic native drivers with this version of the operating system. See the QLogic website for more details http://www.qlogic.com/support/oem_detail_all.asp?oemid=124
Solaris 2.6 5/98 and latest patch-cluster Operating System	Sun StorEdge Configuration Service and CLI management interfaces for the StorEdge 3511 Fibre Channel array with SATA are fully supported with Solaris 2.6 5/98 and the latest patch-cluster. It is required to use the QLogic native drivers with this version of the operating system. You must download and the use the QLogic Solaris SPARC driver package 4.13.01 or later. See the QLogic website for more details http://www.qlogic.com/support/oem_detail_all.asp?oemid=124
Windows 2000 Server, Windows 2000 Advanced Server, Windows 2003	Windows 2000 operating systems requires Service Pack 3. Sun StorEdge Configuration Service is supported with Windows 2000 Server, Windows 2000 Advanced Server and Windows 2003 Server .
Red Hat Linux AS 2.1 & 3.0	Sun StorEdge Configuration Service and CLI management interfaces for the StorEdge 3511 Fibre Channel array with SATA are fully supported with Red Hat Linux AS 2.1 and 3.0 Operating System. For a detailed list of these software components, please refer to the following table titled “Included Software Components”.
HP-UX 11.0 and 11i	Sun StorEdge Configuration Service and CLI management interfaces for the StorEdge 3511 Fibre Channel array with SATA are fully supported with HP-UX 11.0 and 11i Operating Systems. For a detailed list of these software components, please refer to the following table titled “Included Software Components”.
IBM AIX 4.3.3 and 5.1L	Sun StorEdge Configuration Service and CLI management interfaces for the StorEdge 3511 Fibre Channel array with SATA are fully supported with AIX 4.3.3 and 5.1L Operating Systems. For a detailed list of these software components, please refer to the following table titled “Included Software Components”.
Novell Netware 6.5	Sun StorEdge Configuration Service and CLI management interfaces for the StorEdge 3511 Fibre Channel array with SATA are NOT supported on these operating systems. Configuration management is only available through the terminal menu via a telnet or tip session to the array.

Bundled Software Components

The following table lists the software components of **Sun StorEdge Professional Storage Manager**, the management software shipped with the Sun StorEdge 3511 FC Array.

Management Software	Notes and Requirements
Sun StorEdge 3000 Family Configuration Service ver. 1.5	Sun JAVA™ GUI and web browser management interface. Setup and maintain 1 to 30 arrays from one console. Agent on servers communicates to application on console. Servers and console must be on same subnet.
Sun StorEdge 3000 Family Diagnostic Reporter ver. 1.5	This utility provides monitoring and notification of key component and environmental conditions. Works in conjunction with Sun StorEdge Configuration Service (SSCS).
CLI Utility	This utility, shipped on the software CD, can be used for in-band, script-based management. (**Note:** version 1.6 or greater is required for the Sun StorEdge 3511 FC with SATA Array. This version contains functionality for updating firmware as well as gathering information for SATA specific components contained within this product.)
Terminal Menu Window (no included in CD, function resides in RAID controller firmware)	Array/RAID firmware based out-of-band management accessed via the out of band serial or Ethernet ports.

SAN and Other Supported Software

The following table lists SAN, backup, clustering, diagnostic, and other supported software.

Type	Product Name
Sun SAN	Sun SAN 4.4 and higher (includes point to point and public loop support)
Multipathing Software	- Sun StorEdge Traffic Manager 3.1 and greater software for the Solaris Operating System (included in the Sun StorEdge SAN Foundation 4.3 software) - Optional Sun StorEdge Traffic Manager 3.1 software for HP-UX, IBM AIX, Windows 2000, and Windows NT. Sun StorEdge Traffic Manager software works with SSCS to provides a path failover mechanism in the event of failure of a host adapter, switch, or cable. For example, the alternate path functionality allows hot-swapping of controllers in dual-controller configurations. Customers interested in Sun StorEdge Traffic Manager 3.1 for Multi-Platform support should contact Sun Sales or visit http://www.sun.com/sales. For more information on Multi-Platform support see http://www.sun.com/storage/san/multiplatform_support.html. - Dynamic Multipathing option of VERITAS Volume Manager 3.2 and 3.5 software

Clustering Software	- Sun Cluster 3.0 & 3.1 software Configuration Support Notes: - Requires a minimum of RAID firmware version 3.27R, PLD firmware version (version 1000), and SES firmware version 1040. Existing installations using previously released firmware version should upgrade at the customer's earliest convenience. We are not removing support for the previously supported configurations, but new installations should only use the above firmware levels. *Note: It is always recommended to update to the latest released version of these firmwares as they include important performance and reliability enhancements.* - Up to four hosts through a switch - Two hosts direct connect with multi-pathing - Up to four hosts direct connect without multi-pathing (requires mirroring to another Sun StorEdge 3511 FC array). - Up to eight IDs per channel for a maximum of 512 LUNs - One host per channel - VERITAS Cluster (VCS) V3.5 and greater, support for up to 32 nodes (HA extensions not supported) - Netware 6 Cluster Services for Novell Netware 6.5
Backup Software	- VERITAS NetBackup 4.5 and greater software - Solstice Backup™ 6.1 and greater software
Diagnostic Software	- Sun Storage Automated Diagnostic Environment (StorADE) 2.3, Device Edition, is shipped separately without charge when the Sun StorEdge 3511 FC array is ordered through WEBDESK - Sun StorEdge Diagnostic Expert 1.2 software (included with Sun StorEdge Enterprise Storage Manager 1.2 software) ***Note 1****: The Sun Storage StorADE and Diagnostic Expert software products provided limited functionality for the Sun StorEdge 3511 FC arrays. They display asset information and monitor device health only.* ***Note 2****: Patch 116720-07(SUNWstade) is required to be installed in order to work with the Sun StorEdge 3511 RAID array. The standalone Sun StorADE 3511 JBOD is not supported at this time with StorADE.* ***Note 3****: StorADE does not provide diagnostics capability at this time. Upcoming releases of the 3511 as well as patches to StorADE will be released to enhance the interoperability of these products.*
File System Software	- Sun StorEdge Performance Suite 4.0 software (Sun StorEdge QFS software) - Sun StorEdge Utilization Suite 4.0 software (Sun StorEdge SAM-FS software) - VERITAS File System (VxFS) 3.4 and 3.5
Point-in-Time Copying and Remote Mirroring Software	Sun StorEdge Availability Suite 3.2 software (includes point-in-time copy service, formerly known as Sun StorEdge Instant Image software, and remote mirror service, formerly known as Sun StorEdge Network Data Replicator (SNDR) software)

Software-Based Volume Management	- Solstice DiskSuite™ 4.2.1 software, included on installation CD 2 of 2 with the Solaris 8 4/01 Operating System. It can be configured to run on SPARC™ platforms or x86 hardware environments that have the Solaris 8 Operating System installed. - Solaris Volume Manager software, bundled in the Solaris 9 Operating System (both SPARC and X86) - VERITAS Volume Manager 3.2 and 3.5 *Note 1: StorEdge 3511 Array Support Library (ASL) is required to fully support VERITAS Volume Manager 3.5.* *Note 2: The Sun StorEdge 3511 FC array must be running a minimum version 3.27M, 3.27N, 3.27P, 3.27Q or 3.27R of the RAID firmware to support the ASL.* *Note 3: It is always recommended to update to the latest released version of these firmwares*

3rd Party Operating System and Application Certification

The following table lists the Sun StorEdge 3511 FC array 3rd party operating system and application certification.

Certification	Notes and Requirements
Microsoft Windows Hardware Quality Lab (WHQL)	The SE3511 FC Array is now listed in the Windows Server catalog as supported for Windows 2000 and Windows Server 2003. URL: http://www.microsoft.com/whdc/hcl/search.mspx Search for "StorEdge"
Novell Netware	The Sun StorEdge 3511 has completed the necessary qualification testing to be listed for Direct Connect, SAN, as well as Cluster support.

5-Expansion-Unit Support

The number of expansion units (JBODs) supported behind a Sun StorEdge 3511 RAID array is 5 units. There are a couple of points to consider before increasing expansion units beyond one.

- Performance levels off at 4 expansion units (60 drives)
- Rack configuration plans should be reviewed to insure the appropriate cable lengths are ordered with the additional expansion units.
- Dual RAID controller configurations should always be used in expansion configurations.

Solaris™ Operating System, Sun Server and HBA Support

The following tables list the Sun systems and HBAs that are supported for use with the Sun StorEdge 3511 FC with SATA running Solaris SPARC 8 4/01 or higher.

Supported SUN SPARC Servers & 1Gb Connection Methods			
Sun Servers	**(X)6799A 1Gb/sec PCI Single FC Network Adapter**	**(X)6727A 1Gb/sec PCI Dual FC Network Adapter**	**(X)6757A 1Gb/sec SBUS Dual FC Network Adapter**
Ultra™ 60 workstation	Yes	Yes	No
Ultra 80 workstation	Yes	Yes	No
Sun Blade™ 1000 workstation	Yes	Yes	No
Sun Blade 1500 workstation	Yes	Yes	No
Sun Blade 2000 workstation	Yes	Yes	No
Sun Blade 2500 workstation	Yes	Yes	No
Netra™ 20 server	Yes	Yes	No
Netra 210 server	Yes	Yes	No
Netra 240 server	Yes	Yes	No
Netra 1280 server	Yes	Yes	No
Netra t 1120 server	Yes	Yes	No
Netra t 1125 server	Yes	Yes	No
Netra t 1400 server	Yes	Yes	No
Netra t 1405 server	Yes	Yes	No
Sun Enterprise™ 220R server	Yes	Yes	No
Sun Enterprise 250 server	Yes	Yes	No
Sun Enterprise 420R server	Yes	Yes	No
Sun Enterprise 450 server	Yes	Yes	No
Sun Enterprise 3500 server	Yes	Yes	Yes (1)
Sun Enterprise 4500 server	Yes	Yes	Yes (1)
Sun Enterprise 5500 server	Yes	Yes	Yes (1)
Sun Enterprise 6500 server	Yes	Yes	Yes (1)
Sun Enterprise 10000 server	Yes	Yes	Yes (1)
Sun Fire™ 280R server	Yes	Yes	No
Sun Fire V120 server	Yes	Yes	No
Sun Fire V210 server	Yes	Yes	No
Sun Fire V240 server	Yes	Yes	No
Sun Fire V250 server	Yes	Yes	No
Sun Fire V440 server	Yes	Yes	No
Sun Fire V480 server	Yes	Yes	No
Sun Fire V880 server	Yes	Yes	No
Sun Fire V1280 server	Yes	Yes	No
Sun Fire E2900 server	Yes	Yes	No
Sun Fire 4800 server	Yes	Yes	No
Sun Fire 4810 server	Yes	Yes	No
Sun Fire E4900 server	Yes	Yes	No
Sun Fire 6800 server	Yes	Yes	No
Sun Fire E6900 server	Yes	Yes	No
Sun Fire 12000 server	Yes	Yes	No

Supported SUN SPARC Servers & 1Gb Connection Methods			
Sun Servers	**(X)6799A 1Gb/sec PCI Single FC Network Adapter**	**(X)6727A 1Gb/sec PCI Dual FC Network Adapter**	**(X)6757A 1Gb/sec SBUS Dual FC Network Adapter**
Sun Fire 15000 server	Yes	Yes	No
Sun Fire E20000 server	Yes	Yes	No
Sun Fire E25000 server	Yes	Yes	No

Note 1 – Connecting the Sun StorEdge 3511 FC with SATA RAID array to Fibre Channel HBAs on the same channel that use different speeds (1 Gb and 2 Gb) is not supported. You can, however, mix 1-Gb and 2-Gb FC HBAs on different channels. This limitation is due to the design of the Sun StorEdge 3511 FC with SATA RAID array's port bypass circuitry and the inability of Fibre Channel to support auto-negotiation in a multi-drop loop configuration.

Supported SUN SPARC Servers & 2Gb Connection Methods				
Sun Servers	**SG-(X)PCI1FC-QF2 (X6767A) 2 Gb FC Single Channel**	**SG-(X)PCI2FC-QF2 (X6768A) 2 Gb FC Dual Channel**	**SG-(X)PCI1FC-JF2 JNI 2 Gb FC Single Channel**	**SG-(X)PCI2FC-JF2 JNI 2 Gb FC Dual Channel**
Ultra™ 60 workstation	Yes	Yes	Yes	Yes
Ultra 80 workstation	Yes	Yes	Yes	Yes
Sun Blade™ 1000 workstation	Yes	Yes	Yes	Yes
Sun Blade 1500 workstation	Yes	Yes	Yes	Yes
Sun Blade 2000 workstation	Yes	Yes	Yes	Yes
Sun Blade 2500 workstation	Yes	Yes	Yes	Yes
Netra™ 20 server	Yes	Yes	Yes	Yes
Netra 210 server	Yes	Yes	Yes	Yes
Netra 240 server	Yes	Yes	Yes	Yes
Netra 1280 server	Yes	Yes	Yes	Yes
Sun Enterprise™ 220R server	Yes	Yes	Yes	Yes
Sun Enterprise 250 server	Yes	Yes	Yes	Yes
Sun Enterprise 420R server	Yes	Yes	Yes	Yes
Sun Enterprise 450 server	Yes	Yes	Yes	Yes
Sun Enterprise 3500 server	Yes	Yes	Yes	Yes
Sun Enterprise 4500 server	Yes	Yes	Yes	Yes
Sun Enterprise 5500 server	Yes	Yes	Yes	Yes
Sun Enterprise 6500 server	Yes	Yes	Yes	Yes
Sun Enterprise 10000 server	Yes	Yes	Yes	Yes
Sun Fire™ 280R server	Yes	Yes	Yes	Yes
Sun Fire V210 server	Yes	Yes	Yes	Yes
Sun Fire V240 server	Yes	Yes	Yes	Yes
Sun Fire V250 server	Yes	Yes	Yes	Yes
Sun Fire V440 server	Yes	Yes	Yes	Yes
Sun Fire V480 server	Yes	Yes	Yes	Yes
Sun Fire V880 server	Yes	Yes	Yes	Yes
Sun Fire V1280 server	Yes	Yes	Yes	Yes
Sun Fire E2900 server	Yes	Yes	Yes	Yes
Sun Fire 4800 server	Yes	Yes	Yes	Yes

Supported SUN SPARC Servers & 2Gb Connection Methods				
Sun Servers	**SG-(X)PCI1FC-QF2 (X6767A) 2 Gb FC Single Channel**	**SG-(X)PCI2FC-QF2 (X6768A) 2 Gb FC Dual Channel**	**SG-(X)PCI1FC-JF2 JNI 2 Gb FC Single Channel**	**SG-(X)PCI2FC-JF2 JNI 2 Gb FC Dual Channel**
Sun Fire 4810 server	Yes	Yes	Yes	Yes
Sun Fire E4900 server	Yes	Yes	Yes	Yes
Sun Fire 6800 server	Yes	Yes	Yes	Yes
Sun Fire E6900 server	Yes	Yes	Yes	Yes
Sun Fire 12000 server	Yes	Yes	Yes	Yes
Sun Fire 15000 server	Yes	Yes	Yes	Yes
Sun Fire E20000 server	Yes	Yes	Yes	Yes
Sun Fire E25000 server	Yes	Yes	Yes	Yes

Note – The Fibre Channel on-board controllers on the Sun Fire 280R, V480, and V880 systems are not supported. For these systems you must use one of the supported SUN host adapters shown in either the 1 Gb or 2 Gb connection methods above.

Caution – Sun StorEdge SAN Foundation software is required to be installed on the host where the adapter is installed. Please refer to the Sun StorEdge 3511 FC with SATA Array Release Notes (*817-6597-10*) for specific instructions.

Solaris Boot Support

Only Solaris 8 and 9 SPARC Operating Systems are supported at this time. SAN boot for Sun Fire servers must strictly follow the SAN 4.4 or 4.5 guidelines. See the SAN Guidelines for servers and HBAs that are supported.

Solaris 2.6 Support

Support for Solaris 2.6 is now available. Use the following HBAs and the native Qlogic drivers. You must download and use the Qlogic Solaris SPARC driver package 4.13.01 or later. See the Qlogic website for more details http://www.qlogic.com/support/oem_detail_all.asp?oemid=124

Solaris 2.6 5/98 and latest patch-cluster			
Sun Servers	**SG-XPCI1FC-QF2 (X6767A) 2Gb PCI Single Channel FC HBA**	**SG-XPCI2FC-QF2 (X6768A) 2Gb PCI Dual Channel FC HBA**	**(X)6757A 1Gb SBus Dual Channel FC HBA**
Netra t 1120 server	**Yes**	**Yes**	No
Netra t 1125 server	**Yes**	**Yes**	No
Netra t 1400 server	**Yes**	**Yes**	No
Netra t 1405 server	**Yes**	**Yes**	No
Sun Enterprise™ 220R server	Yes	Yes	No
Sun Enterprise 250 server	Yes	Yes	No
Sun Enterprise 420R server	Yes	Yes	No
Sun Enterprise 450 server	Yes	Yes	No
Sun Enterprise 3500 server	Yes	Yes	Yes (1)
Sun Enterprise 4500 server	Yes	Yes	Yes (1)
Sun Enterprise 5500 server	Yes	Yes	Yes (1)
Sun Enterprise 6500 server	Yes	Yes	Yes (1)

Solaris 2.6 5/98 and latest patch-cluster			
Sun Enterprise 10000 server	Yes	Yes	Yes (1)
Ultra™ 60/80 workstation	Yes	Yes	No

Note 1 - Connecting the Sun StorEdge 3511 FC with SATA RAID array to Fibre Channel HBAs on the same controller channel that uses different speeds (1Gb & 2Gb) is not supported. You can, however, mix 1-Gb and 2-Gb FC HBAs on different controller channels. This limitation is due to the design of the Sun StorEdge 3511 FC with SATA RAID array's port bypass circuitry and the inability of Fibre Channel to support auto-negotiation in a multi-drop loop configuration.

Solaris X86 9 04/04 Operating System, Sun Server and HBA Support

Sun Servers	SG-XPCI1FC-QF2 (X6767A) 2Gb PCI Single Channel FC HBA	SG-XPCI2FC-QF2 (X6768A) 2Gb PCI Dual Channel FC HBA	(X)5133A 1Gb PCI Single Channel FC HBA	(X)9279A 2Gb PCI Single Channel
Sun Fire V60x/V65x	Yes	Yes	Yes	No
Sun Fire V20z	Yes	Yes	No	Yes

Note – Requires using Qlogic's native driver. Sun StorEdge SAN Foundation is expected to be included in Solaris x86 10.

Linux Operating System, Sun Server and HBA Support

The following table lists the Sun systems that are supported for the Sun StorEdge 3511 FC with SATA array and the adapters supported for each of the supported systems for the Red Hat Linux Operating System.

Sun Servers	SG-XPCI1FC-QF2 (X6767A) 2Gb PCI Single Channel FC HBA	SG-XPCI2FC-QF2 (X6768A) 2Gb PCI Dual Channel FC HBA	(X)5133A 1Gb PCI Single Channel FC HBA	(X)9279A 2 Gb PCI Single Channel
Sun Fire V60x/V65x	Yes (1)	Yes (1)	Yes	No
Sun Fire V20z	Yes (2)	Yes (2)	No	Yes (2)

Note 1 - Support for this FC HBA adapter is provided for both Red Hat Enterprise Linux Advanced Server 2.1 and 3.0 using Qlogic's native driver.

Note 2 - Support for this FC HBA adapter is provided only for Red Hat Enterprise Linux Advanced Server 3.0 using Qlogic's native driver.

Other Operating Systems, 3rd Party Server and HBA Support

The table below lists supported connection methods for Microsoft Windows, Red Hat Linux, Netware, HP-UX and IBM AIX Operating Systems.

Operating Systems	QLogic QLA2310F, QLA2340, QLA2342	Emulex LP952L, LP982, LP9002L, LP9802, L8000 F1-N1	Hewlett Packard A5158A, A6795A	IBM 6227, 6228
Microsoft Windows 2000 and 2003	Yes	Yes	No	No

Operating Systems	QLogic QLA2310F, QLA2340, QLA2342	Emulex LP952L, LP982, LP9002L, LP9802, L8000 F1-N1	Hewlett Packard A5158A, A6795A	IBM 6227, 6228
Red Hat Linux AS 2.1 and 3.0	Yes	No	No	No
IBM AIX 4.3.3, and 5.1L	No	Yes **(1)**	No	Yes
HP-UX 11.0 and 11i	No	Yes	Yes	No
Novell NetWare 6.5	Yes **(2)**	No	No	No

Note 1 – The only Emulex HBA supported on this platform is LP9002L If a customer wants to use other HBAs, please use the Get To Yes (GTY) process.

Note 2 – The only Qlogic HBA supported on this platform at this time is QLA2342. If a customer wants to use other HBAs, please use the Get To Yes (GTY) process.

Peripheral Support Matrix

The following products are supported on the Sun StorEdge 3511 Fibre Channel array with SATA at general availability. Additional hardware and software products are scheduled for support in subsequent releases.

Category	Description
SATA Disk Drive	Drives include drive carrier. Supported drives are: - 250-GB, 7200-rpm drives (part number XTA-ST1NC-250G7K)
Additional RAID Controller	FC hardware RAID controller, 1-GB memory, and battery backup unit. Can be added to StorEdge 3511 Expansion Array or StorEdge 3511 RAID Array (part number XTA-3511-CTRL-1G)
SFP Modules	2-Gb copper-to-optical short-wave (part number XSFP-SW-2GB) (default) 2-Gb copper-to-optical long-wave (part number XSFP-LW-2GB)
Optional Power and Cooling Unit	XTA-3511-DC-Kit, Sun StorEdge 3511 DC power and cooling unit (hot-swap) (common part between 3310, 3510, 3511)
FC Switches	The Sun StorEdge 3511 supports all of the Fibre Channel switches documented in the Sun StorEdge SAN What Works With What (WWWW) Matrix located at: http://webhome.ebay/networkstorage/sales/matrix.html Note: SE3511 FC array will negotiate down to 1Gb link speed when connected to Sun SAN compliant 1Gb switch.
Cables	- 2-meter LC/LC Fibre Channel Optical Cable, P/N X9732A - 5-meter LC/LC Fibre Channel Optical Cable, P/N X9733A - 15-meter LC/LC Fibre Channel Optical Cable, P/N X9734A - 25-meter LC/LC Fibre Channel Optical Cable, P/N X9736A - 50-meter LC/LC Fibre Channel Optical Cable, P/N X9738A
Rail Kits	- XTA-3000-2URK-19U Universal Rail Kit for Sun Racks and industry standard 19" RETMA racks - XTA-3000-2URK-19C 19" TELCO rack, center mount rail kit - XTA-3000-2URK-19F 19" TELCO rack, front mount rail kit
Table Top Conversion Kit	- XTA-3000-2U-R2T SE3xxx Tabletop conversion kit

Note: *Customers who have already purchased cables should check the manufacturing part numbers listed above against the manufacturing part numbers stamped on the cables to determine whether the cables are supported.*

Non-Supported Configurations

Sun receives numerous inquires regarding what is missing from the Supported Systems and Adapters, (What Works With What), with the Sun StorEdge 3511 FC array. The following table is provided to help reduce the effort required to determine what is not supported with this array. Qualification and support status of the items listed in this table are subject to change. Check the latest version of this JTF on SunWIN for updated information.

System/Hardware/Software/Feature	Support Status
Sun Fire 3800 server	Not qualified/supported – Use Get To Yes process
cPCI host bus adapters	Not qualified/supported – Use Get To Yes process
On board FC controllers of any VSP server	Not qualified/supported
Solaris 2.5.1 Operating System support	Not qualified/supported
HP-UX cluster support	Not qualified/supported
IBM AIX cluster support	Not qualified/supported

Sun Expansion Cabinets/Racks

The following Sun cabinets and racks are supported with the Sun StorEdge 3511 Fibre Channel array with SATA:

Cabinet Name	Cabinet Part Number(s)	Required Kit (s)	Required Kit Part Number	Maximum Number of Arrays Supported per Cabinet
Sun StorEdge 72-inch Expansion Cabinet	SG-(X)ARY030A	Rack mount Kit	(X)TA-3000-2URK-19U	14
Sun Fire Cabinet	SF-(X)CAB, SFE-(X) CAB	Rack mount Kit	(X)TA-3000-2URK-19U	5
Sun Rack 900 Cabinet	SR90(X)KM038A-IP	Rack mount Kit	(X)TA-3000-2URK-19U	18
Sun Fire 6800 System	F6800-1	Rack mount Kit	(X)TA-3000-2URK-19U	3
Sun Fire E6900 System	E6900-BASE	Rack mount Kit	(X)TA-3000-2URK-19U	2
Standard EIA Cabinets	Not Applicable	Rack mount Kit	(X)TA-3000-2URK-19U	Varies
Telco flush mount racks	Not Applicable	Rack mount Kit	(X)TA-3000-2URK-19F	Varies
Telco center-of-gravity racks	Not Applicable	Rack mount Kit	(X)TA-3000-2URK-19C	Varies

Mounting Options

The Sun StorEdge 3511 Fibre Channel array with SATA comes in tabletop or rack ready configurations for Sun racks, including the Sun StorEdge expansion rack and the Sun Fire rack. Kits are available for additional rack configurations.

Note: *Rack-ready configurations of the Sun StorEdge 3511 Fibre Channel array with SATA do* ***NOT*** *come with any rack mount rail kits. Customers must order one of the following, depending on their needs.*

Rail Kits	- XTA-3000-2URK-19U Universal Rail Kit for Sun Racks and industry standard 19" RETMA racks - XTA-3000-2URK-19C 19" TELCO rack, center mount rail kit - XTA-3000-2URK-19F 19" TELCO rack, front mount rail kit
Table Top Conversion Kit	- XTA-3000-2U-R2T SE3xxx Tabletop conversion kit

The Sun StorEdge 3511 Fibre Channel arrays with SATA are rackmountable, NEBS Level 3 certified, mass storage subsystems. The 2U-high Sun StorEdge 3511 Fibre Channel array with SATA utilizes 2-Gb Fibre Channel interface externally to the host ports.

Configuration management and enclosure event reporting are enabled through an in-band FC or out-of-band 10/100 BASE-T Ethernet port and a DB9 serial port. Sun's host-based Sun StorEdge Configuration Service software is used for management and event monitoring. This software can be also be launched from a web browser.

Each Sun StorEdge 3511 Fibre Channel RAID array holds up to twelve dual-ported Serial ATA drives and allows up to five expansion drive arrays. The Sun StorEdge 3511 Fibre Channel array with SATA supports single or dual redundant FC disk array controllers. Each 2-Gb FC controller has 1-GB battery-backed data cache with intelligent caching algorithms and supports support RAID levels 0, 1, 1+0, 3, 5, 3+0, and 5+0; up to 1024 LUNs in private loop DAS and 1024 LUN public loop/full fabric/half duplex and 64 LUNs in point to point mode, full fabric with full duplex support; and 256 command tag queues (CTQs).

Each 2U-high drive array can contain one or two identical 1-GB caching RAID controllers. With two RAID controllers installed, they are configured for redundancy and mirrored write cache so if either controller fails or is removed, the remaining controller takes over the workload (failover). The dual RAID controller in active-active failover configurations is designed to provide fail-safe, continuous, online protection.

Each RAID controller can support up to four direct-attached host I/O ports when in a non-redundant path mode.

Note: *In dual controller configurations, the maximum number of direct-attached host I/O ports is eight when in non-redundant path mode.*

Both the RAID array and expansion array support up to twelve 1-inch high (low-profile) dual-ported Serial ATA disk drives. A maximum configuration (one RAID array plus five expansion drive arrays) supports up to 72 disk drives. Drive arrays are connected to each other via optional external FC cables.

This rackmountable NEBS Level 3 certified system is an extremely reliable storage system with redundant hot-swappable field-replaceable units (FRUs).

Note: *The Sun StorEdge 3511 array can be installed in either a Sun StorEdge expansion rack or the new Sun™ Rack 900.*

Dual hot-swap/redundant load-sharing/load-balancing 100 to 240VAC or -48 or -60VDC power and cooling units each have separate power inputs and contain two high-velocity (52 CFM) fans with detection circuitry to monitor degraded performance provides superior temperature control.

Fan rotation sensors watch for degraded cooling performance which provides superior over-temperature protection.

Each RAID controller includes one event monitoring integrated circuit. This circuit monitors all internal +12 and +5 DC voltage outputs per power and cooling unit. Seven temperature sensors and two fan speed sensors from each unit are monitored by the event monitoring integrated circuit. This circuit controls front and rear panel display LEDs and buzzer alarm.

Hardware Features

- High-performance hot-swap RAID controller with two FC-AL loops for the attachment of expansion units and four dual-purpose FC-AL llops for servers, FC switches, or expansion units
- Dual FC RAID controllers can be configured in active-to-active failover mode
- Supports 5 to 12 low-profile 3.5-inch Serial ATA disk drives per RAID array or expansion unit
- Dynamic disk drive storage expansion capabilities within and across RAID and expansion unit chassis
- Supports up to five expansion units per RAID array for a total of 72 disk drives
- Supports 250GB 7200 rpm disk drives
- All major components such as SATA disk drives, RAID controllers, lithium-ion batteries, and power and cooling are redundant hot-swappable field replaceable units (FRUs)
- All FRUs are easily removed without the use of tools; thumbscrews are used to secure all FRUs
- Configuration management and event reporting enabled through in-band Fibre Channel or out-of-band 10/100 Base-T Ethernet port and serial port
- The 2u Sun StorEdge 3511 Fibre Channel array with SATA incorporates System Enclosure Services (SES) circuits to monitor enclosure environmental information:
    - The SES circuitry alarm buzzer and green/amber LED indicators on front and rear panels provide environmental and hardware status on enclosure and FRUs.
    - The SES controller intelligence monitors all internal +12 and +5 voltages per power and cooling unit. The SES controller chip monitors the various temperature sensors located throughout the enclosure, and monitors each fan.
    - Both RAID and expansion unit enclosures can support dual SES failover capabilities for fully redundant event monitoring reliability.
    - The SES protocol can be connected in-band (via FC cable) from one Sun StorEdge 3511 RAID array to a Sun StorEdge 3511 expansion array without the need for other external cables.
    - Auto detection of installation of all major components such as disk drives, fan trays, power supplies, and RAID controllers are monitored by the SES logic.
- Dual Redundant hot-swap power supplies provides N+1 high availability
- Power supplies feature load-sharing/load balancing, and auto ranging AC and DC voltage input capability
- Four high-speed (52-CFM) fans provide redundancy N+1 high availability and efficient cooling
- Redundant hot-swappable or hot-serviceable FRUs
    - Active/active RAID controller modules
    - Hot-swappable disk drives (air management sleds are placed in empty drive slots)
    - N+1 redundant hot-swappable power and cooling units with common power rail for continuous fan operation even if one unit has been shut down
    - Hot-swappable battery cache modules

    - All FRUs easily accessible from the front or rear of the system
- Front and rear green/amber bi-color LEDs and resettable audible alarm for fault isolation
- Designed and tested to pass NEBS Level 3; GR-63-CORE, GR-1089-CORE
- Designed and tested to pass a subset of MIL-STD-810F air, land, and marine deployment
- Web-based 10/100BASE-T Ethernet support for management and monitoring
- Serial port out-of-band management and monitoring with remote monitoring support
- 1-GB ECC cache memory per controller, fixed non-upgradeable
- Battery backup for cache, approximately 72 hours hold time

Firmware Features

- Simultaneous support for RAID levels 0, 1, 3, 5, 1+0, 3+0, 5+0
- Local and global spare disk drives, with applicable RAID levels
- Up to 1024 LUNs private loop DAS, 1024 LUNs public loop/full fabric switch enabled/half duplex, 64 LUNs point to point/full fabric/switch enabled/full duplex.
- Firmware LUN masking
- Non-disruptive controller firmware upgrades (no downtime for firmware upgrades) in dual-controller RAID chassis
- Logical volume support (spanning logical drives)
- Write back and write through cache control (factory default is write back)
- In-band and out-of-band SES support for RAID arrays
- Built-in SNMP traps and MIB support
- Online drive firmware flash support via the CLI

Input Power Options

- Dual-input load-sharing/load-balancing 100 to 240VAC universal input, load sharing
- Dual-input load-sharing/load-balancing –48VDC (-36VDC to –75VDC) or –60VDC input capabilities available

Power and Cooling Units

The Sun StorEdge 3511 Fibre Channel array with SATA has two fully redundant 420-Watt power supplies with load-sharing and load-balancing capabilities. Each AC power and cooling unit has auto-ranging capability from 90VAC to 264VAC and 47Hz to 63Hz. With these redundant power supplies, one maintains electrical power to the system if the other fails.

A single power and cooling unit can spin up, maintain, and sustain power for a fully loaded Sun StorEdge 3511 Fibre Channel array with SATA unit.

DC output voltages have over-voltage protection, over current, and short circuit protection. Output current capacity is shown in the table below:

DC Output	Minimum Load	Maximum Load
+5 V	0 A	35 A
+12 V	250 mA	25 A

Both power and cooling units are removable canisters that slide into one of two slots in the back of the system. Each power and cooling unit canister has a locking handle, power status LED, AC power cord connector, and power switch.

Each power and cooling unit housing contains two axial 52 CFM fan assemblies. Each fan is electrically isolated and powered by +12-volt common rail. This allows the fans to continue to run from the redundant power and cooling unit even though their power and cooling units are turned off. Both 80-mm axial fans are connected together in series to allow blade synchronization upon power on.

Each power and cooling unit is hot-swappable and can be replaced while the Sun StorEdge 3511 Fibre Channel array with SATA controller and expansion arrays are in operation. Only one power and cooling unit can be hot-swapped at a time.

Sun StorEdge 3511 Fibre Channel array with SATA I/O Architecture

There are two sections on this topic:

- The Fibre Channel I/O ports as they relate to the RAID and expansion arrays.
- Example connectivity rules and guidelines for certain storage and server scenarios.

Major Components, RAID Array

The Sun StorEdge 3511 Fibre Channel RAID array includes the following major components, as shown in the figure below:

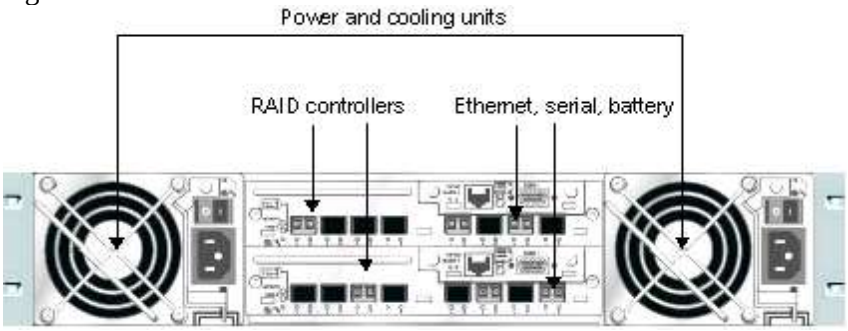


Figure 2. Major components, RAID array

Connector Type	Location
Ethernet RJ-45 10BASE-T connector	Battery module
DB9 serial connector	Battery module
Fibre Channel connectors	RAID-I/O module
AC power outlets	Power and cooling unit
DC power outlets	Power and cooling unit

Note: *Each array can support either AC or DC power, not both simultaneously.*

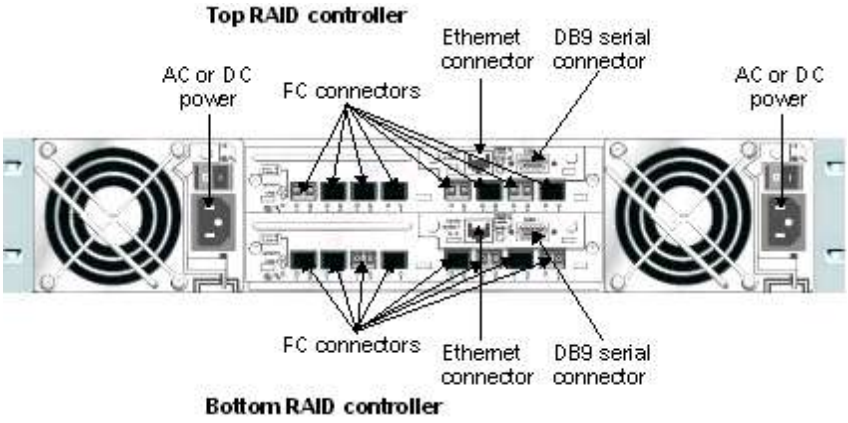


Figure 3. Rear panel of RAID array, dual controller configuration

RAID Fibre Channel I/O Ports

Note 1: *All Fibre Channel ports require SFP modules before they can be used. Some configurations ship with factory-installed SFP modules.*

Note 2: *In the single RAID controller, these SFPs are installed in Fibre Channel ports 0, 1, 4, and 5. In a dual RAID controller, they are installed in ports 0, 1, 4, and 5 in the top controller and 0 and 5 in the bottom controller.*

Note 3: *In the expansion unit, SFPs are installed in the top left and bottom right ports.*

Note 4: *The default SFPs are short-wave (part number XSFP-SW-2GB). Optional long-wave SFPs are available (XSFP-LW-2GB).*

Figure 4. Small form factor pluggable (SFP) modules

Each RAID controller integrates Fibre Channel I/O ports, 0, 1, 2, 3, 4, and 5 within each RAID FRU module. Therefore, in a dual controller configuration, there are two RAID I/O modules, each with eight Fibre Channel ports for a total of 16 ports.

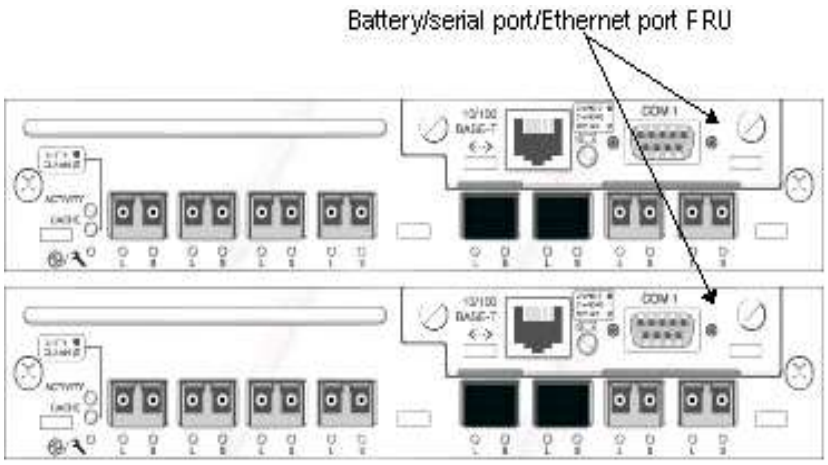


Figure 5. RAID-I/O FRU, Sun StorEdge 3511 Fibre Channel array with SATA (dual RAID controller configuration)

***Note 1**: All Fibre Channel ports can be used for drive connectivity.*

***Note 2**: FC ports 0, 1, 4, and 5 can be used for host or drive connectivity.*

***Note 3**: FC ports 2 and 3 can only be used for drive connectivity.*

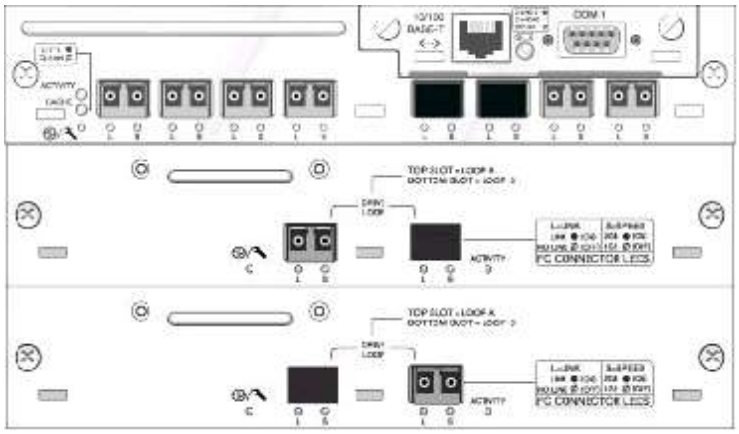


Figure 6. RAID-I/O FRU, Sun StorEdge 3511 Fibre Channel array with SATA (single RAID controller configuration)

These components are located on the RAID Fibre Channel I/O FRU of the Sun StorEdge 3511 Fibre Channel array with SATA (dual RAID controller version):

- Eight Fibre Channel I/O ports per RAID controller (16 in dual controller configuration)
- Hot-swappable battery module with integrated 10/100 Ethernet port and 9-pin serial port per RAID controller

Rear Panel Connectors, Expansion Array

The following connectors are located on the modules of the rear panel of the expansion unit.

Connector Type	Location
Fibre Channel connectors	I/O module
AC power outlets	Power and cooling unit
DC power outlets	Power and cooling unit

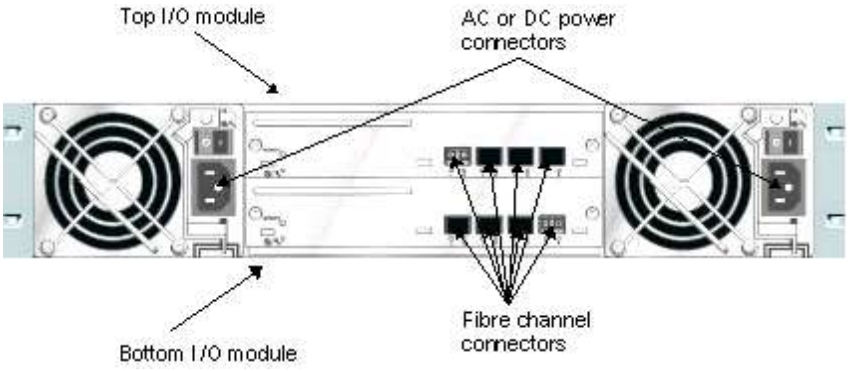


Figure 7. Rear panel of the expansion array

Storage Expansion Fibre Channel I/O Ports

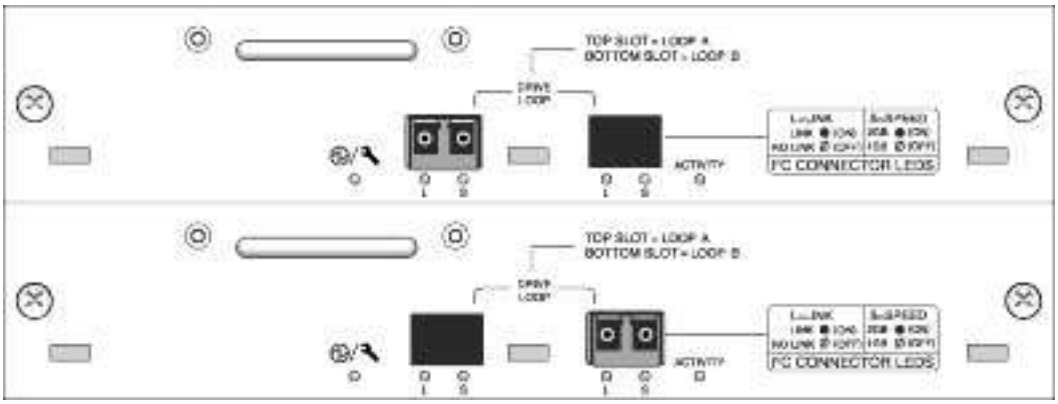


Figure 8. Expansion-I/O modules, Sun StorEdge 3511 Fibre Channel array with SATA

***Note**: Each Sun StorEdge 3511 FC expansion unit ships with both the top and the bottom I/O module, as depicted in the figure above.*

Logical Drive and LUN Configuration Guidelines

There are limitations in regards to the maximum number of disk and logical drive configuration

with specific RAID sets. The tables below show the correspondence between the number of disks supported, LUN capacity, and RAID levels.

Note: *Random optimization uses a 32-KB block size and supports a 512-GB LUN capacity. Sequential optimization uses a 128-KB block size and supports a 2-TB LUN capacity.*

Maximum Number of Disk Drives per Logical Drive and per Configuration			
Max Usable Capacity per Logical Drive (GB)	**Maximum Number of 250GB Disks per Logical Drive, with Sequential Optimization**	**Maximum Number of Logical Drives per Configuration**	**Maximum Number of Disk used in a Configuration**
1908	8	8	8 disk drives x 8 logical drives = 64 disk drives for storage + 8 disk drives for global spares = 72 disk drives total = 1 RAID array + 5 expansion units

Connectivity Rules and Guidelines

The Sun StorEdge 3511 Fibre Channel array with SATA can be configured in three modes:

1. Private loop (DAS connectivity)
2. Point to point, fabric switch attached (switch fan out, full duplex)
3. Public loop, fabric switch attached (switch fan out, half duplex)

The internal hub ASIC that enable this configuration change is configurable via the management software. The selection for "Loop Only" or "Point to Point" plus the correct cabling allows the three configurations.

The following screen shot shows the actual GUI where the selection is made to configure the array for private loop or point to point mode.

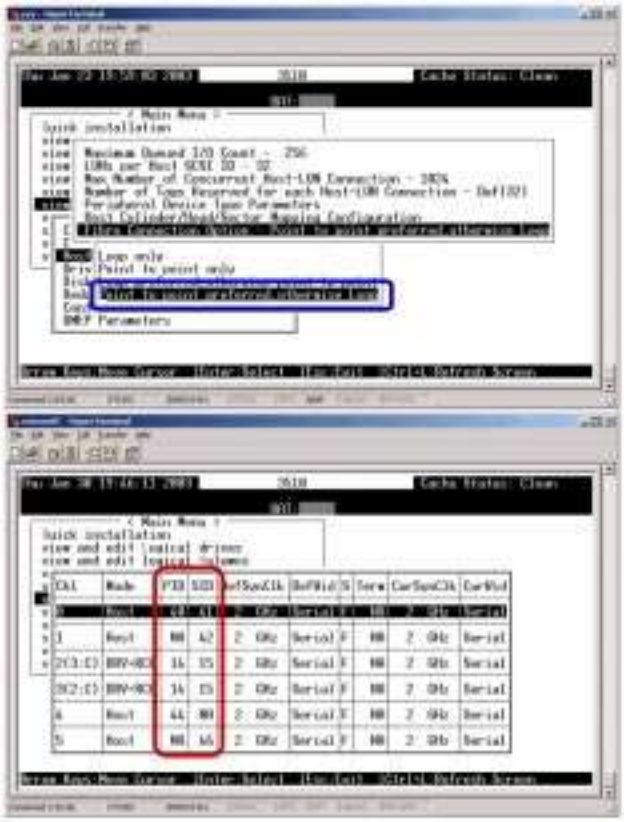


Figure 9. Configuration menu for private loop or point to point mode

Private Loop Mode — Direct Attached Connection (DAS)

Features

- Cost-effective path failover support without switches
- Four redundant host port connections
- Eight non-redundant host port connections
- Maximum port utilization
- Maximum LUN utilization (up to 1024 LUNs)

Caveats

- Limited to four redundant host connections
- No duplex support for increased performance
- No external networked storage capability
- I/O cards provide four discrete channels for host attachment
- The four channels are implemented as four separate loop segments using FC-AL hub technology
- Each loop segment allows two host connections to both the primary and the secondary

controller

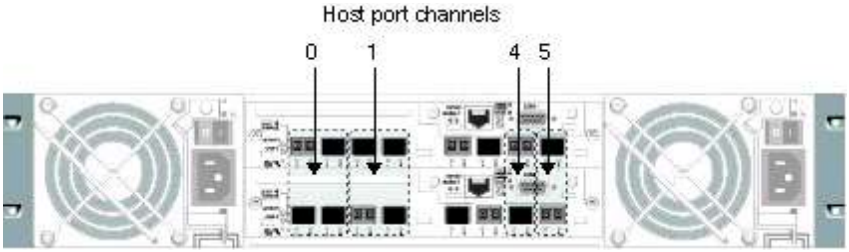


Figure 10. Four discrete loop segments

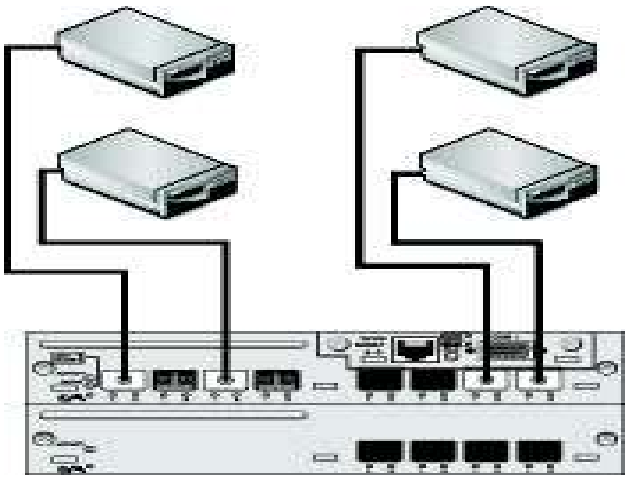


Figure 11. Scenario 1, private loop connectivity option

Note: *Controllers are NOT hot-swappable in this configuration.*

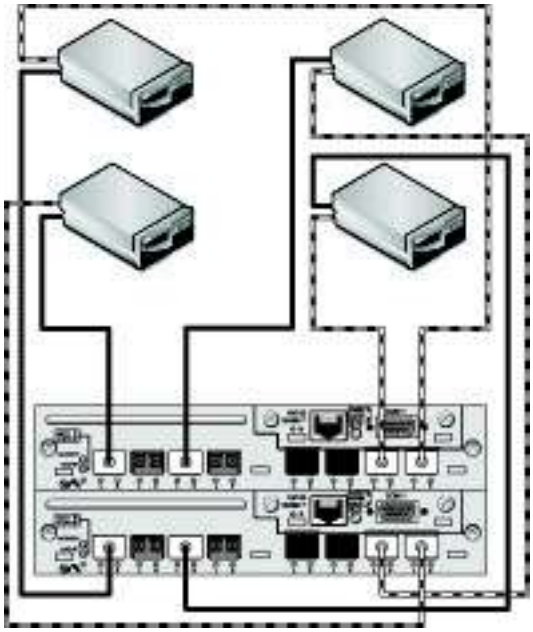


Figure 12. Scenario 2, private loop connectivity option

Note: *Controllers ARE hot-swappable in this configuration when used in conjunction with Sun StorEdge Traffic Manager alternate pathing software.*

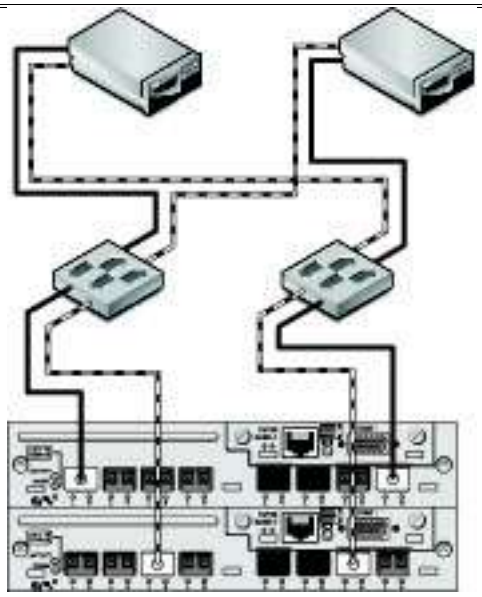


Figure 13. *Scenario 4, private loop connectivity option*

Note: *Controllers ARE hot-swappable in this configuration when used in conjunction with Sun StorEdge Traffic Manager alternate pathing software.*

Point-to-Point Mode — Fabric Switch Attached

Features

- External networked storage

- Sun SAN 4.1/4.2 support
- Maximum number of host connections via switch fan out
- Best performance with full duplex support

Caveats

- Limited to two redundant/four switch port connections
- Used in pairs for LUN/path failover
- Limited to 64 LUNs maximum (16 mirrored LUNs per loop pair)
- Up to 14 hosts may be attached via dual 16 port fabric switches for high availability
- Two channels are used per fabric
- LUNs are mapped in an interlaced fashion across both controllers
- Two channels per controller

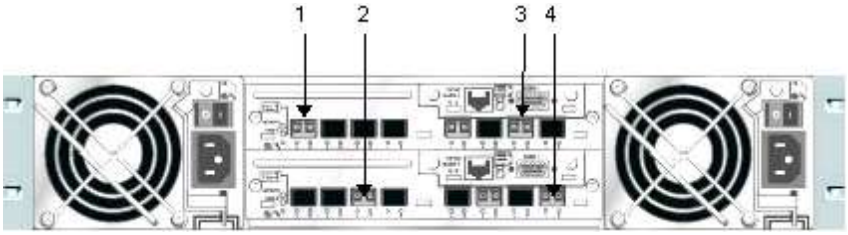


Figure 15. Four 2-Gb Fibre Channel point to point connections

Public Loop Mode — Fabric Switch Attached

Features

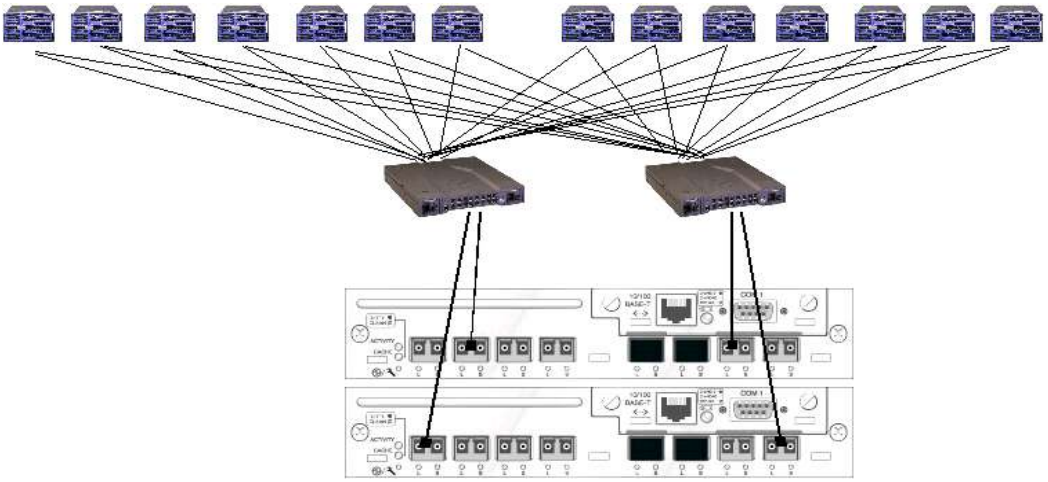
- External networked storage
- Sun SAN 4.1/4.2 support
- Maximum LUNs for fabric switch attached (1024 LUNs)
- Maximum number of host connections via switch fan out

Caveats

- Half duplex only (paths are in a loop vs. parallel)
- No full duplex support for increased performance (vs. point to point full duplex)
- Limited to two redundant/four switch port connections
- Used in pairs for LUN/path failover

Configuring for Point-to-Point or Public Loop Mode

- Verify that the controller port personality is set for "point to point mode" or "loop mode." This selection is made via the management software option and sets the internal hub and port bypass circuits to the appropriate configuration. Point to point mode provides full duplex/best performance but is limited to 64 LUNs total. Loop mode provides 1,024 LUNs total but is half duplex with less performance vs. point to point mode (assuming duplex software configuration support).



- Port/cable connectivity is the same for "point to point mode" or "loop mode."

Figure 16. Four 2-Gb Fibre Channel point to point connections, full fabric, two 16-port switches, 14 hosts

Connecting COM Port to a VT100 Terminal or Workstation

For a first-time configuration, users must assign an IP address to the chassis via the COM port of either controller module. Users can configure the RAID controller drive array via the COM port, or via the Ethernet port after they set up the IP address.

When users configure the RAID controller drive array for the first time, it automatically configures the primary controller and transfers the same configuration to the secondary controller.

Connecting Ethernet Port to LAN/WAN

To connect a RAID controller drive array to an Ethernet port, users must first assign an IP address to the RAID controller drive array via the Sun 2U COM port and a VT100 terminal or workstation.

Connect the Ethernet port of one of the controllers to the LAN connection. This connection allows for configuration and monitoring of RAID controller and expansion drive arrays remotely.

Note: *In a dual-controller configuration, the Ethernet ports on both controllers must be connected in order to fully manage the array when one controller fails.*

Front Panel Indicators

This section describes the components accessed at the front of the Sun StorEdge 3511 Fibre Channel array with SATA.

- Light indicators at the far right hand side of panel indicating (from top to bottom):
    - Power
    - Fan
    - Temperature
    - Event

Immediately below the Event LED is an audible-alert RESET push button. Behind the lockable

front door are:

- Drive bays containing disk drive modules (drive sleds)
- Light indicators (LEDs) indicating drive status adjacent to each drive bay

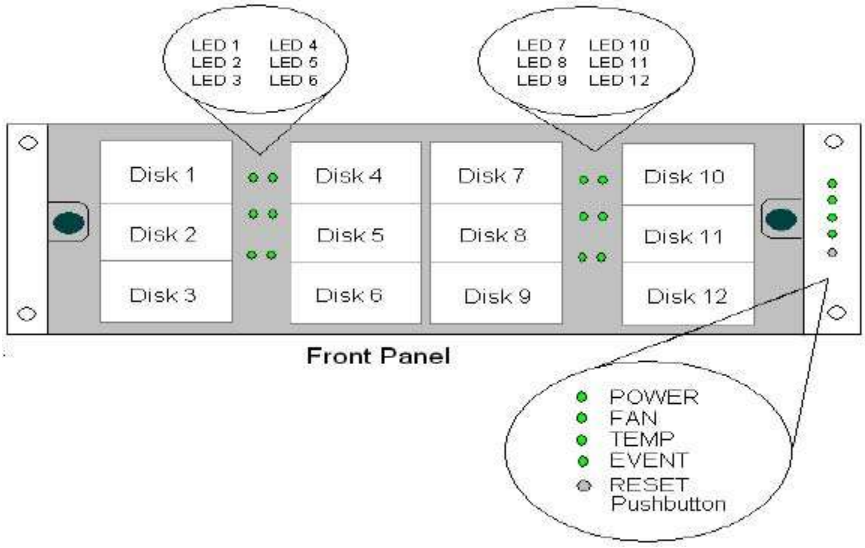


Figure 18. Front panel of the Sun StorEdge 3511 Fibre Channel array with SATA

Status LEDs

The Sun StorEdge 3511 Fibre Channel array's LEDs are listed in the following tables.

Front Panel LEDs on Right Side (arranged from top to bottom as listed)		
LED	**Purpose**	**Color Code**
Power	Power and cooling unit status - DC output voltage within tolerance specification. Over-current protection shutting down any voltage output is also displayed. Voltage thresholds: - +5VDC +/-0.25 VDC - +12VDC +/-0.6 VDC Current thresholds: - +5VDC 35 A - +12VDC 25 A	Static Green = Good Static Amber = Failed = One or more output voltages out of range
Fan	Fan speed within nominal operational rpm specification of 5000 rpm Failed Fan RPM Threshold: 3150 rpm	Static Green = Good = Over 3150 rpm Static Amber = Faulty/Failed = Under 3150 rpm
Temp	Temperature level status indicating violations of internal temperature thresholds of 55° and 60°C	Static Green = Good = Under temperature threshold of 55°C Static Amber = Failed = Temperature threshold equal to or over 55°C Blinking Amber = Failed = Temperature threshold equal to or over 60°C Blink Frequency of 4 Hz +/– 1 Hz

RAID I/O	Status indicator to indicate any failure event in RAID controller or I/O board	Static Green = Good = Normal functional operation of RAID controller or I/O board Static Amber = Failed RAID controller or I/O board
Drives	Drive power up and spin up OK Drive activity Drive failure	Static Green Flashing Green (random blink pattern) Static Amber

Rear Panel LED on RAID Controller		
LED	**Purpose**	**LED Color Definition**
Busy Status LED	Busy status of host and disk ports	Static Green = not busy Blinking Green = Busy
I/O FRU Status LED	Status of RAID controller and I/O module	Static Green = Good Static Amber = Failed RAID controller or I/O module
Battery Charge LED	Status of battery	Static Green = Battery charged Blinking Green = Battery charging Static Amber = Battery failed
Dirty Cache LED	Status of memory cache; dirty cache indicates if data is not written to disk.	LED off = Clean cache Static Amber = Dirty cache

LED	**Purpose**	**LED Color Definition**
SFP Left LED	SFP status	Static Green = Good Fibre Channel connection Off = Empty or failed FC connection
SFP Right LED	SFP speed status	Static Green = 2 Gb Off = 1 Gb
Power and Cooling LED	Power and cooling unit status; DC output voltage within tolerance specification. Over-current protection shutting down any voltage output is also displayed. Voltage thresholds: - +5 VDC +/-0.25 VDC - +12VDC +/-0.6 VDC Current thresholds - +5VDC 35A - +12VDC 25A	Static Green = Good Static Amber = Failed = One or more output voltages out of range /fan speed under 3150 rpm
Ethernet Link LED	Status of Ethernet link	Static Green = Active link Off = Inactive connection
Ethernet Active LED	Status of Ethernet activity	Flashing Green = Busy

Reliability, Availability, and Serviceability (RAS)

The Sun StorEdge™ 3511 Fibre Channel array includes the reliability, availability, and serviceability (RAS) features listed below.

Reliability

The reliability features of the Sun StorEdge 3511 Fibre Channel array with SATA include:

- NEBS Level 3 certified
- MIL-STD-810F compliant for air, land, and marine deployment
- Load-sharing/load-balancing extends power and cooling unit life

Availability

Availability features of the Sun StorEdge 3511 Fibre Channel array with SATA include:

- Dual hot-swap/redundant load-sharing/load-balancing power supplies with separate inputs
- Hot-swap/redundant high-velocity (52 CFM) electrically isolated cooling fans are powered by a +12-volt common rail and contain detection circuitry to monitor degraded performance provide superior temperature control. Fans continue to run from the redundant power and cooling unit even though their power and cooling unit is turned off. The twin 80-mm axial fans in each power and cooling unit are connected together in series to allow blade synchronization upon power up.
- Hot-swap redundant event monitoring units
- Hot-swap redundant RAID controllers with mirrored synchronized-write cache (optional configuration)

Serviceability

Failover

The Sun StorEdge 3511 Fibre Channel array with SATA supports both hard- and soft-failover capabilities.

- Hard failover

The Sun StorEdge 3511 Fibre Channel array with SATA automatically switches from the failed component to the redundant component.

- Soft failover

The Sun StorEdge 3511 Fibre Channel array with SATA provides the ability to manually failover a component for hardware upgrades, and so on.

Field-Replaceable Units (FRUs)

The Sun StorEdge 3511 Fibre Channel array's major components are field-replaceable units (FRUs) and are easily accessible from the front or rear of the unit. Each FRU has a set of LEDs

which indicate health and status of the array. Virtually any single hot-swap field-replaceable unit (FRU) can be removed quickly and easily from the subsystem while running applications. All FRUs are easily accessible from the front or rear of the subsystem.

The Sun StorEdge 3511 Fibre Channel array with SATA consists of four types of FRUs that are easily removed without tools. These are:

- RAID controllers (one or two) (Sun StorEdge Traffic Manager alternate pathing software and specific cabling methodology is required for hot-swap RAID controllers)
- Battery backup module (one or two)
- Two power supplies, AC or DC with integrated power and cooling unit
- Up to twelve Serial ATA disk drives (hot-swappable)

Physical Specifications

Description	Rackmount	Desktop
Height	3.5 in. (8.89 cm) - 2U	3.64 in. (9.25 cm)
Width	17.6 in. (44.7 cm) – body only	19 in. (48.26 cm)
Depth – Main chassis – Chassis with fan modules – Chassis with fan modules and handles	 18.0 in. (45.72 cm) 20.0 in. (50.80 cm) 21.5 in. (53.34 cm)	
Unpackaged Weight (without drives)	30 lb. (13.61 kg)	
Packaged Weight (without drives)	37 lb. (16.78 kg)	
Weight (fully loaded with 12 drives)	59.1b. (26.8 kg)	
Packaged Weight (fully loaded with 12 drives)	70.5 lb. (31.9 kg)	

Heat and Air Flow

- Air flow for the Sun StorEdge™ 3511 array is from front to rear.
- A fully populated array dissipates a maximum of 894 BTU per hour.

Primary Input Voltage/Frequency Range

Input selection is automatic, and the power supply operates continuously over the required input range.

The AC power supply is capable of supplying full rated output power in the input voltage range of 90 VAC to 250VAC from a single phase source.

The following table shows input power at different voltages , 50Hz (worst case), and states of operation for 2 AC power supplies in Watts, Amps and BTUs :

Watts per Input Voltage / Frequency	**Idle**	**Operating**	**Spin Up**
90 VAC / 50Hz	208.3 Watts	264.1 Watts	555.0 Watts
115 VAC / 50Hz	234.9 Watts	262.3 Watts	672.9 Watts
264 VAC / 50Hz	249.7 Watts	283.3 Watts	1212.9 Watts
Amps per Input Voltage / Frequency	**Idle**	**Operating**	**Spin Up**
90 VAC / 50Hz	2.31 Amps	2.93 Amps	6.17 Amps
115 VAC / 50Hz	2.04 Amps	2.28 Amps	5.85 Amps
264 VAC / 50Hz	0.95 Amps	1.07 Amps	4.59 Amps
BTUs per Input Voltage / Frequency	**Idle**	**Operating**	**Spin Up**
90 VAC / 50Hz	710.8 BTUs	901.2 BTUs	1894.3 BTUs
115 VAC / 50Hz	801.8 BTUs	895.2 BTUs	2296.4 BTUs
264 VAC / 50Hz	852.3 BTUs	966.8 BTUs	4139.5 BTUs

The following table shows input power at 115 Volts, AC , 60Hz, and states of operation for 2 AC power supplies in Watts, Amps and BTUs :

Watts per Input Voltage / Frequency	Idle	Operating	Spin Up
115 VAC / 60Hz	237.9 Watts	262.1 Watts	698.8 Watts
Amps per Input Voltage / Frequency	**Idle**	**Operating**	**Spin Up**
115 VAC / 60Hz	2.07 Amps	2.28 Amps	6.08 Amps
BTUs per Input Voltage / Frequency	**Idle**	**Operating**	**Spin Up**
115 VAC / 60Hz	812.0 BTUs	894.5 BTUs	832 BTUs

AC Input Power

AC input power with both power supplies operating:

- Nominal input voltage: 100VAC to 240VAC
- Input voltage range: 90VAC to 264VAC
- Input frequency range: 47 Hz to 63 Hz

DC input Power

- Nominal input voltage: -48 or -60VDC
- Input voltage range: -36VDC to 75VDC

Environmental Specifications

Feature	Specifications
Temperature	
• Operating	5°C to 40°C (41°F to 104°F)
• Non-operating	-40°C to 65°C (-40° F to 149°F)
Relative Humidity	
• Operating	10% to 90% relative humidity, 27°C max. wet bulb, non-condensing
• Non-operating	0% to 90% relative humidity, 38°C max. wet bulb, non-condensing
Altitude	
• Operating	-30 m to 3048 m (-100 to 10,000 ft.)
• Non-operating	-30 m to 12,192 m (-100 to 40,000 ft.)
Shock	
• Operating	5.0 G, 11-ms, half-sine
• Non-operating	15.0 G, 11-ms, half-sine
Vibration	
• Operating	0.20 G, 5 to 500 Hz, swept-sine
• Non-operating	1.0 G, 5 to 500 Hz, swept-sine
Heat Output	894 BTUs/hr
Acoustical Noise	LWAD = 6.6 Bels

Certifications and Regulations

Meets or exceeds the following requirements.

Standard	Specifications
Safety	UL Listed, CSA-C22.2 No. 60950-00, EN 60950: 2000, IEC 60950, GS, GOST, S-Mark
Emission	FCC Part 15 Class B, ICES-003, EN 300 386, EN55022 Class B, VCCI Class B, EN AS/NZS 3548 Class B, BSMI Class B
Harmonics & Flicker	EN 61000-3-2, EN 61000-3-3
Immunity	EN 300 386, EN 55024
Certifications	NEBS Level 3 certified (GR-63-CORE; GR-1089-CORE), MIL-STD-810F, ETSI EN 300 019

Electromagnetic Compatibility

Country	Standard
U.S.	FCC #47, Part 15, Subpart B, Class A (standalone minimum)
Canada	ICES-003
Japan	VCCI Class B
European Union, Germany	EN 55022:1998 Class B
Australia/New Zealand	AS/NZS 3548:1996
China	GB4943-1995, GB9254-1998, GB17625,1-1998 (CCC mark)
Korea	MIC Korea
Taiwan	BSMI CNS 13438 Class B (standalone minimum)
Russia	GOST-R mark
Argentina	S mark

Electromagnetic Interference

Test	Standard
Harmonics Emissions	EN 61000-3-2:2000 (No Limits)
Voltage Flicker	EN 61000-3-3:1995/A1:2001 (No Limits)
ESD	EN 55024 (8kV Contact, 15kV Air)
RF Field	EN 55024 (10V/m)
Electrical Fast Transient Burst	EN 55024 (1kV I/O, 2kV Power)
Surge	EN 55024 (1kV I/O, 1kV Power L-L, 2kV Power L-G)
RF Conducted	EN 55024 (3V I/O and Power)
Power Frequency Magnetic Field	EN 55024 (N/A monitors only)
Voltage Dip and Interruption	EN 55024 (0V/0.5cycle, 70%V/0.5sec, 0V/5sec)

Compliance Product Safety by Country

Standard	Specifications
Safety	
IEC 60950 (C22.2-60950) (EN60950) (UL60950)	CUL Notice of Authorization
EMC and Safety	Telcordia GR-1089-CORE test report
Emissions and Immunities	
RF Radiated Emissions	CISPR22 (EN55022), Class B – European Union FCC Part 15, Class B – USA, Industry of Canada
Conducted Emissions	CISPR22 (EN55022), Class B – European Union FCC Part 15, Class B – USA, Industry of Canada
Harmonic Emissions	IEC 61000-3-2:2000 (No Limits) – European Union
Voltage Flicker	IEC 61000-3-3:1995/A1:2001 (No Limits)
ESD Immunity	CISPR 24 (EN55024; 8kV Contact, 15kV Air) IEC 61000-4-2
RF Field Immunity	CISPR 24 (EN55024, 10V/m) IEC 61000-4-3
Electrical Fast Transient/Burst Immunity	CISPR 24 (EN55024; 1kV I/O, 2kV Power) IEC 61000-4-5
Surge Immunity	CISPR 24 (EN55024; 1kV I/O, 1kV Power L-L, 2kV Power L-G) IEC 61000-4-5
RF Conducted Immunity	CISPR 24 (EN55024; 3V I/O and Power) IEC 61000-4-6
Power Frequency Magnetic Field Immunity	CISPR 24 (EN55024) IEC 61000-4-8
Voltage Dip and Interruption	CISPR 24 (EN55024; 0v/0.5 cycle, 70%V/0.5 sec., 0V/5 sec.)
Voltage Dips/Short Interruptions/Voltage Variation Immunity	IEC 61000-4-11
NEBS Compliance (Environmental and Physical)	Telcordia GR-63-CORE, Certified Level 3 (No margin requirement) (Telco, - 48VDC Only) GR-1089-CORE
ETSI (Environmental and Emissions)	EN 300 386

Standard	Specifications
MIL-STD-810F	Method 500.4 Altitude Method 501.4 High Temperature Method 502.4 Low Temperature Method 507.4 Humidity Method 509.4 Salt Fog Method 514.5 Category 4 Transportation Vibration Method 514.5 Category 21 Watercraft Vehicle Method 516.5 Functional Shock (15G's operational) Method 516.5 Bench Handling
Acoustic Noise	ISO 7779:1988

Country	Standard
U.S.	UL Listed to UL60950:2000, 3rd Edition
Canada	CSA Standard CAN/CSA-C22.2 No. 60950-00 3rd Edition
Germany	TUV GS mark (ergonomics) (Rheinland)
European Union	EN60950:2000
Japan	Part of World-wide CB Scheme
Australia	Part of World-wide CB Scheme
China *	CCC mark
Russia *	Hygienic Mark (ergonomics)
Argentina	Resolution 92-98 (S-Mark)

Electromagnetic Interference

Test	Standard
Harmonics Emissions	EN 61000-3-2:2000 (No Limits)
Voltage Flicker	EN 61000-3-3:1995/A1:2001 (No Limits)
ESD	EN 55024 (8kV Contact, 15kV Air)
RF Field	EN 55024 (10V/m)
Electrical Fast Transient Burst	EN 55024 (1kV I/O, 2kV Power)
Surge	EN 55024 (1kV I/O, 1kV Power L-L, 2kV Power L-G)
RF Conducted	EN 55024 (3V I/O and Power)
Power Frequency Magnetic Field	EN 55024 (N/A monitors only)
Voltage Dip and Interruption	EN 55024 (0v/0.5 cycle, 70%V/0.5 sec., 0V/5 sec.)

Country	Standard
U.S.	FCC #47, Part 15, Subpart B, Class A (standalone minimum)
Canada	ICES-003
Japan	VCCI Class A
European Union Germany	EN 55022:1998 Class A (standalone minimum)
Australia/New Zealand	AS/NZS 3548:1996
China *	GB4943-1995, GB9254-1998, GB17625,1-1998 (CCC mark)
Taiwan	BSMI CNS 13438 Class A (standalone minimum)
Korea *	MIC Korea
Russia *	GOST-R mark
Argentina	S-Mark

Configuration and Management Software

There are four ways to configure and manage a Sun StorEdge™ 3511 Fibre Channel array:

1. Terminal menu interface — This method allows the MOST control over the Sun StorEdge 3511 FC, since it "taps" directly into the array's RAID controller firmware.

Examples of the terminal menu interface are shown below.

Figure 19. Terminal menu interface, main menu

Figure 20. Terminal menu interface, cache status

Note: *To configure an X86/Linux, HP-UX, or IBM AIX server, only method 1 (the terminal menu interface) is applicable.*

2. Sun StorEdge Configuration Service (SSCS) Graphical User Interface

   A. This requires that an SSCS agent utility be loaded onto a Solaris™ Operating Environment server that is connected to a Sun StorEdge 3511 Fibre Channel array with SATA that is to be managed/monitored.

   B. An SSCS console utility must also be loaded onto a Solaris Operating Environment

workstation.

C. From an SSCS console, the user can manage an X number of SSCS agents/Sun StorEdge 3511 Fibre Channel arrays.

D. SSCS can also be used to dynamically change RAID controller firmware (when there are dual redundant controllers installed).

E. SSCS agent/console utilities for the Solaris Operating Environment are included in the Sun StorEdge 3511 FC software CD shipping package.

F. More details on SSCS are found in the sections below.

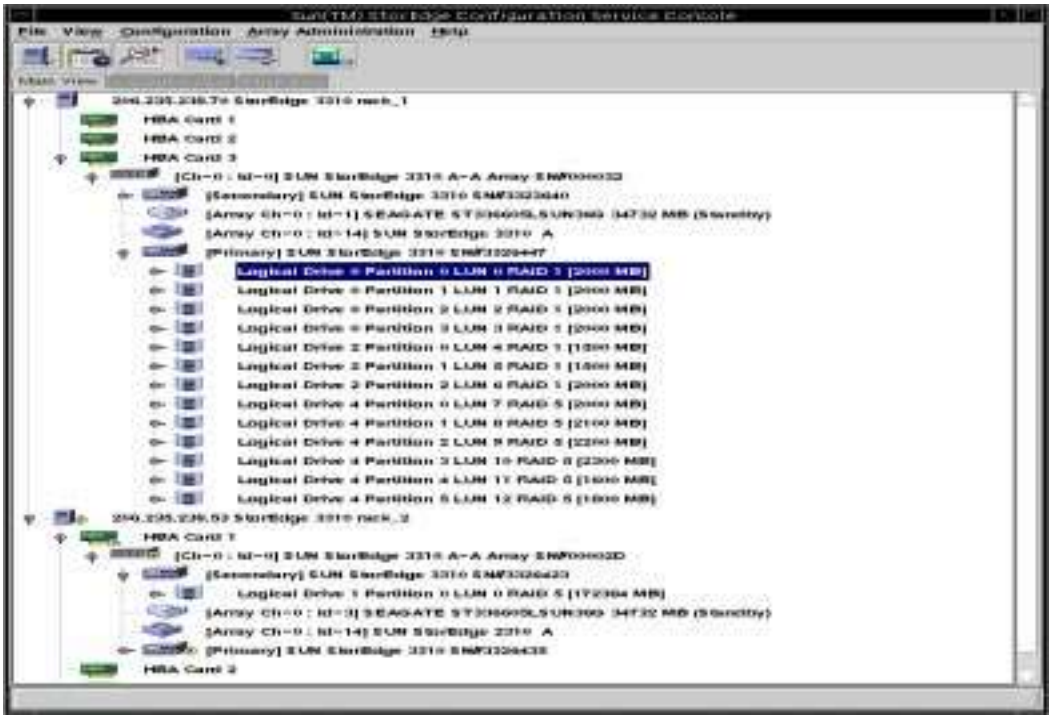


Figure 21. Sun StorEdge Configuration Service GUI

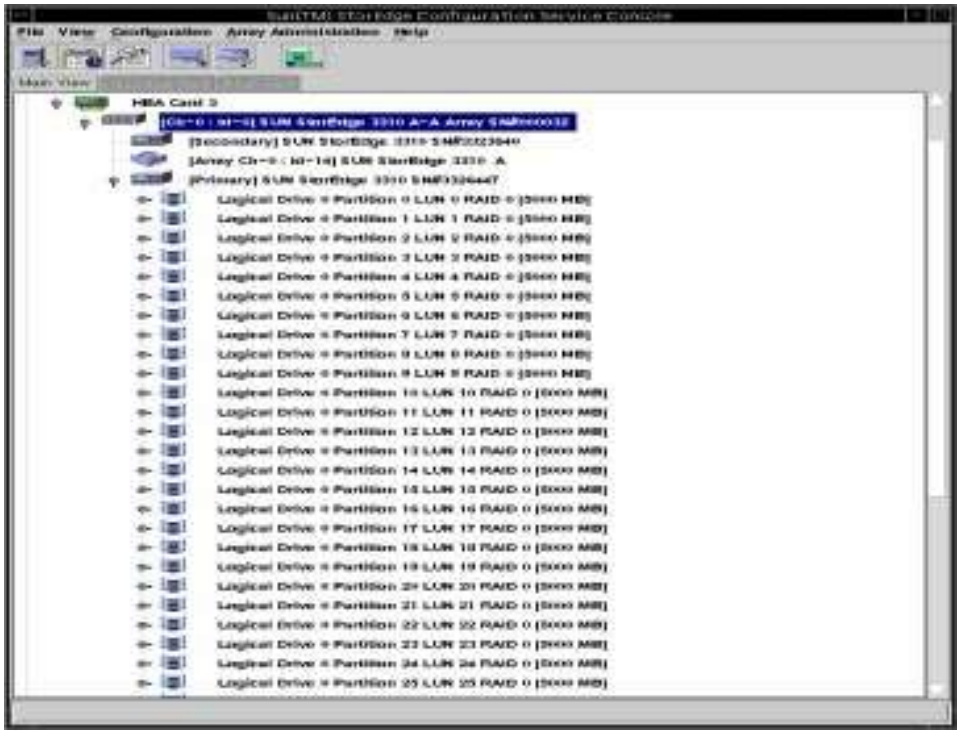


Figure 22. Sun StorEdge Configuration Service GUI

3. Web Browser — This method allows SSCS to be launched from a web browser (Netscape™ 4.7+). The functionality is the same as SSCS itself.

Figure 23. Sun StorEdge Configuration Service GUI, launched via web browser

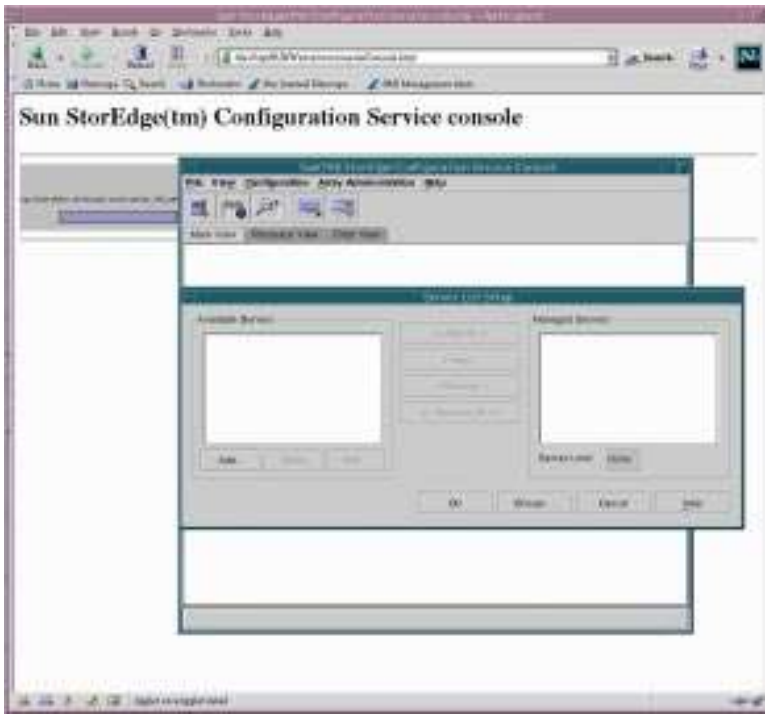


Figure 24. Sun StorEdge Configuration Service GUI, from web browser

Note 1: *The three methods discussed above can be used when the array is attached to a Solaris Operating Environment or Microsoft Windows 2000/NT-based server only.*

Note 2: *To configure an X86/Linux, HP-UX, or IBM AIX server only method 1 (the terminal menu interface) is applicable.*

4. Command Line Interface (CLI) – This method allows configuration of the Sun StorEdge 3511 array through traditional scripting methods.

Sun StorEdge Configuration Service Software

Sun StorEdge Configuration Service (SSCS) software is a Java™ technology-based software program that combines storage configuration, maintenance, and monitoring tools into a single, easy-to-use application. SSCS software provides centralized administration of Sun StorEdge 3511 FC storage systems across existing local and wide area networks. This software helps simplify storage management and can reduce its administration costs.

The Sun StorEdge Configuration Service software graphical interface uses intuitive controls and graphics to present configuration options, maintenance features, and status information for storage systems and servers. A color-coded design provides feedback and clear status information for each component. Critical conditions that require immediate attention are always easily identified and simple to locate. Configuration features and controls are well marked and operate smoothly. SSCS software is very easy to learn through its use of familiar interface elements.

Sun StorEdge Configuration Service software provides complete monitoring of Sun StorEdge 3511 RAID controllers, disk drives, etc. From a single Sun StorEdge Configuration Service console, system administrators can view and make changes to entire Sun StorEdge 3511 storage systems. In the event of a status change, Sun StorEdge Diagnostic Reporter software sends real-

time, proactive alerts to the system administrator via its console display, e-mail, or through an alphanumeric pager, allowing users to monitor the system remotely.

Storage setup and management is easy with Sun StorEdge Configuration Service software. Custom configuration options allow network administrators to configure storage volumes, RAID levels, cache modes, stripe sizes, and other storage parameters to meet particular server and application requirements.

Sun StorEdge Configuration Service also allows dynamic array firmware upgrades when there are dual redundant controllers configured. With SSCS software's ease of use and attention to detail, even ambitious storage installations are simple to manage.

Configuration services features include the following:

- GUI based management and monitoring
- Phone home alert support (email alerts)
    - Defines the types of message traps sent, the timing of messages sent, forward encrypted messages, and receive messages on the Diagnostic Reporter which functions as an email viewing program.
    - Operates in background mode continuously on the computer where it is installed and also has a controlling Sun StorEdge Configuration Service Agent (a controlling agent is the only agent which talks to a specific array).

Sun StorEdge Traffic Manager Alternate Pathing Software

To help maximize data accessibility and path redundancy, Sun recommends that customers implement Sun StorEdge Traffic Manager software. This software is independent of Sun StorEdge Configuration Service software and provides a path failover mechanism in the event of HBA, switch, or cable failure.

On the Sun StorEdge 3511 Fibre Channel array with SATA, Sun StorEdge Traffic Manager software supports the following operating systems:

- Solaris 8 and 9 Operating Environment
- HP-UX 11.0 and 11i IBM
- AIX 4.3.3 and 5.1L (32 and 64 bit)
- Microsoft Windows NT and 2000

Sun StorEdge Traffic Manager software for the Solaris 8 and 9 Operating Environments is included with each UltraSPARC™ III server from Sun at no additional charge. For more information on the use of Sun StorEdge Traffic Manager software in operating environments other than the Solaris Operating Environment, refer to

http://www.sun.com/storage/san/multiplatform_support.html.

Sun StorEdge Traffic Manager for Microsoft Windows, IBM AIX, and HP-UX is available to purchase from Sun Microsystems and its authorized resellers.

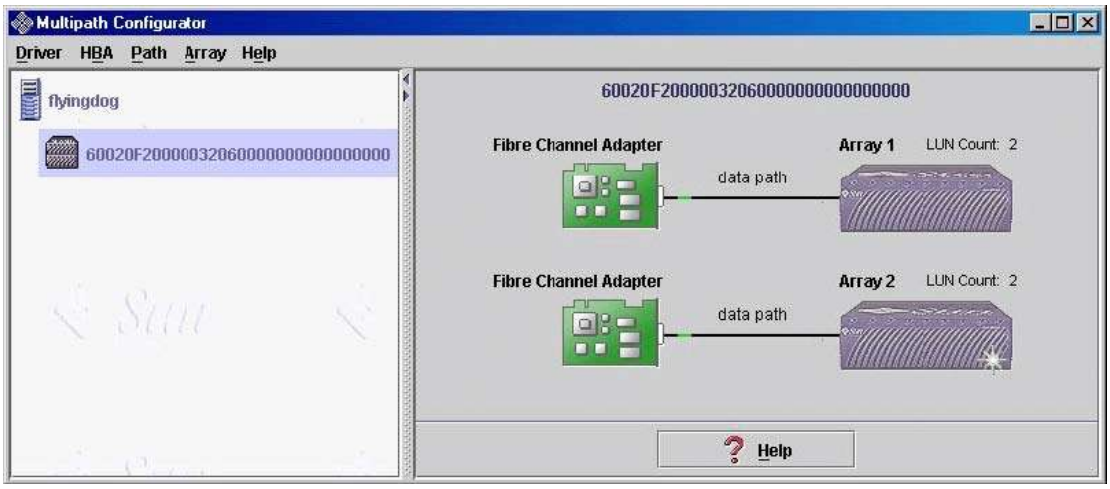


Figure 25. Sun StorEdge Traffic Manager software, main screen

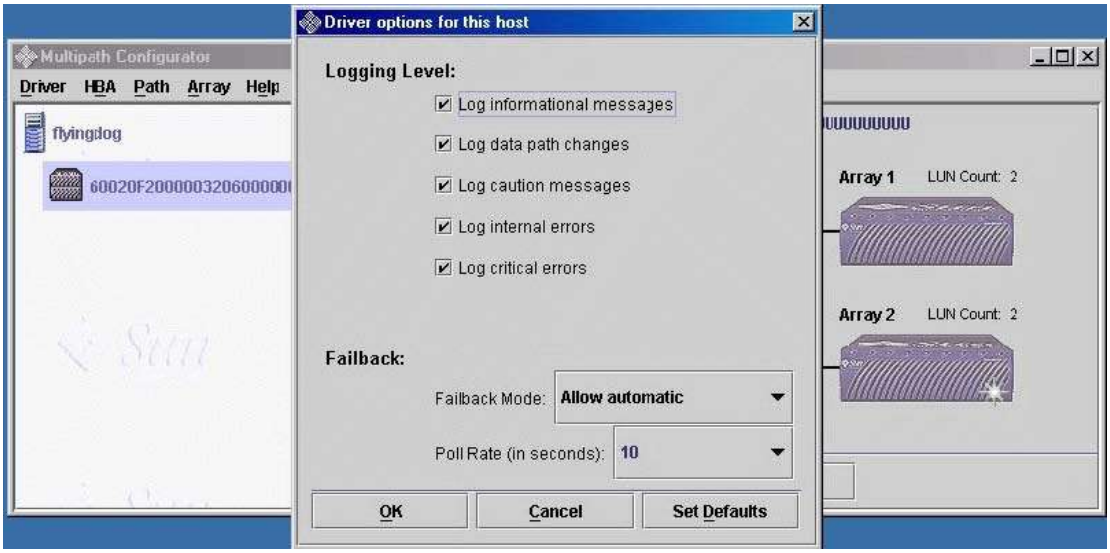


Figure 26. Driver options screen

Figure 27. HBA properties screen

Sun SAN Support

The Sun StorEdge 3511 Fibre Channel array with SATA is fully supported under Sun's SAN 4.1 and 4.2 release. Refer to the SAN 4.1/4.2 WWWW (SunWIN token number 347688) for a complete list of supported switches and other interconnects and the SAN 4.1/4.2 Just the Facts (SunWIN token number 345251) for supplementary information. This matrix is also located at the following URL: http://webhome.sfbay/networkstorage/sales/matrix.html.

Shipping Configurations

The shipping configurations for the Sun StorEdge™ 3511 Fibre Channel array are shown below.

Note: *For all configurations, AC power cord country kits are ordered separately. DC power configurations include two -48 volt DC power cords.*

JBOD Expansion Unit Base Configuration

The Sun StorEdge 3511 Fibre Channel array with SATA JBOD expansion unit base configuration ships with the following accessories:

- Two short-wave SFPs
- One 12-inch Fibre Channel Expansion Cable (RAID controller to JBOD Expansion)
- One CD containing Sun StorEdge Configuration Service Management and Diagnostic Reporter
- Software, installation and configuration documents
- Two power cord lock kits

Single RAID Controller Base Configuration

The Sun StorEdge 3511 Fibre Channel array with SATA single RAID controller base configuration ships with:

- Four short-wave SFPs
- One 25-foot CAT 5 cable (for out-of-band management)
- One 25-foot serial null modem cable (for out-of-band management)
- One DB9 to DB25 adapter
- One CD containing Sun StorEdge Configuration Service Management and Diagnostic Reporter
- Software, installation and configuration documents
- Two power cord lock kits

Dual RAID Controller Base Configuration

The Sun StorEdge 3511 Fibre Channel array with SATA dual RAID controller base configuration ships with:

- Six short-wave SFPs
- One 25-foot CAT 5 cable (for out-of-band management)
- One 25-foot serial null modem cable (for out-of-band management)
- One DB9 to DB25 adapter
- One CD containing Sun StorEdge Configuration Service Management and Diagnostic Reporter

- Software, installation and configuration documents
- Two power cord lock kits The basic system configuration can be determined from the components of each part number. Here is an example part number, with each component explained.

Note 1: ***A****ll Sun StorEdge™ 3511 Fibre Channel array configurations ship with documentation and software CD. There is NO hard copy documentation, with the exception of release notes.*

Note 2: *All configurations ship with dual redundant power supplies standard. Customers can order either AC or DC equipped versions.*

Note 3: All configurations ship with the nameplate "Sun StorEdge 3500" affixed on the front bezel.

Note 4: ***A****ll RAID controller versions ship with one serial cable and one Ethernet cable for management. All expansion versions ship with two Fibre Channel cables. RAID-equipped arrays DO NOT come with any Fibre Channel cables. Refer to "Cables" later in this section for a list of supported cables.*

Note 5: *For five-drive configurations, the five corresponding drive carriers are included and installed with the drives in the array. The remaining seven empty drive bays do NOT come with empty drive carriers. Customers can purchase additional Sun StorEdge 3511 Fibre Channel array with SATA specific X-option drives, which do come with drive carriers.*

Note 6: *The Sun StorEdge 3511 Fibre Channel array with SATA drive carriers are UNIQUE – Sun StorEdge T3, A5200, etc. drive carriers CANNOT be used in the Sun StorEdge 3511 Fibre Channel array.*

Note 7: *All drive bays MUST be populated with either 1) a drive; or 2) an air management sled. This is critical to maintain proper air flow and cooling in the system.*

Note 8: *All RAID controller configurations ship pre-configured with RAID level 5, and a global standby hot-spare drive.*

Note 9: *Rack-ready configurations do NOT come with any rackmount rail kits. Customers need to order one of the following, depending on their needs:*

- Rack kit, 2U 19-inch cabinet 22 to 28-inch (part number XTA-3000-2URK-19U)

- Rack kit, 2U 19-inch cabinet 28 to 36-inch (part number XTA-3000-2URK-19U); use with Sun StorEdge cabinet/Sun Fire rack

- Rack kit, 2U 19-inch cabinet Telco center mount (part number XTA-3000-2URK-19C)

- Rack kit, 2U 19-inch cabinet Telco front mount (part number XTA-3000-2URK-19F)

Note 10: ***A****ll pricing for the Sun StorEdge 3511 Fibre Channel array with SATA is listed under discount Category P.*

Part Number Format Description

The basic system configuration can be determined from the components of each part number. Here is an example part number, with each component explained.

Example part number = XTA3511R01A0W3000

X = X-option

T = Sun StorEdge product designator

A = Revision level

3511 = Model number

R = Physical configuration: R = rack ready , T = tabletop

01 = Reserved

A = Power Supply Type: A = AC, D = DC

0 = Number of controllers per array: 0 = Expansion, 1 = 1 RAID controller, 2 = 2 RAID controllers

W = Drive size, type and rpm: W = 3.5-inch, 250GB, 7200 rpm SATA

3000 = Capacity in GB: 3000 = 12 x 250-GB drives

RAID Controller Drive, AC Power Part Numbers

Part Number	Description
250-GB 7200 rpm Disk Configurations	
XTA3511R01A0W1250	Sun StorEdge 3511 Fibre Channel array, rack ready, 1250 GB (5 x 250-GB 7200-rpm disks) with JBOD, two AC power supplies, and Sun StorEdge Configuration Service software (Standard Configuration)
XTA3511R01A0W3000	Sun StorEdge 3511 Fibre Channel array, rack ready, 3000 GB (12 x 250-GB 7200-rpm disks) with JBOD, two AC power supplies, and Sun StorEdge Configuration Service software
XTA3511R01A1W1250	Sun StorEdge 3511 Fibre Channel array, rack ready, 1250 GB (5 x 250-GB 7200-rpm disks) with 1FC RAID controller, 1GB cache, two AC power supplies, and Sun StorEdge Configuration Service software (Standard Configuration)
XTA3511R01A0W3000	Sun StorEdge 3511 Fibre Channel array, rack ready, 3000 GB (12 x 250-GB 7200-rpm disks) with 1FC RAID controller, 1GB cache, two AC power supplies, and Sun StorEdge Configuration Service software
XTA3511R01A2W1250	Sun StorEdge 3511 Fibre Channel array, rack ready, 1250 GB (5 x 250-GB 7200-rpm disks) with 2FC RAID controller, 1GB cache, two AC power supplies, and Sun StorEdge Configuration Service software (Standard Configuration)
XTA3511R02A0W3000	Sun StorEdge 3511 Fibre Channel array, rack ready, 3000 GB (12 x 250-GB 7200-rpm disks) with 2FC RAID controller, 1GB cache, two AC power supplies, and Sun StorEdge Configuration Service software
TA3511R01A0W1250	Sun StorEdge 3511 Fibre Channel array, rack mounted, 1250 GB (5 x 250-GB 7200-rpm disks) with JBOD, two AC power supplies, and Sun StorEdge Configuration Service software (Standard Configuration)
TA3511R01A0W3000	Sun StorEdge 3511 Fibre Channel array, rack mounted, 3000 GB (12 x 250-GB 7200-rpm disks) with JBOD, two AC power supplies, and Sun StorEdge Configuration Service software
TA3511R01A1W1250	Sun StorEdge 3511 Fibre Channel array, rack mounted, 1250 GB (5 x 250-GB 7200-rpm disks) with 1FC RAID controller, 1GB cache, two AC power supplies, and Sun StorEdge Configuration Service software (Standard Configuration)

TA3511R01A0W3000	Sun StorEdge 3511 Fibre Channel array, rack mounted, 3000 GB (12 x 250-GB 7200-rpm disks) with 1FC RAID controller, 1GB cache, two AC power supplies, and Sun StorEdge Configuration Service software
TA3511R01A2W1250	Sun StorEdge 3511 Fibre Channel array, rack mounted, 1250 GB (5 x 250-GB 7200-rpm disks) with 2FC RAID controller, 1GB cache, two AC power supplies, and Sun StorEdge Configuration Service software (Standard Configuration)
TA3511R02A0W3000	Sun StorEdge 3511 Fibre Channel array, rack mounted, 3000 GB (12 x 250-GB 7200-rpm disks) with 2FC RAID controller, 1GB cache, two AC power supplies, and Sun StorEdge Configuration Service software

Fibre Channel Cables

Part Number	Description
X9732A	2-meter LC to LC Fibre Channel optical cable
X9733A	5-meter LC to LC Fibre Channel optical cable
X9734A	15-meter LC to LC Fibre Channel optical cable
X9736A	25-meter LC to LC Fibre Channel optical cable
X9738A	50-meter LC to LC Fibre Channel optical cable
X9740A	100-meter LC to LC Fibre Channel optical cable
X9721A	0.4-meter SC to LC Fibre Channel optical cable
X9722A	2-meter SC to LC Fibre Channel optical cable
X9723A	5-meter SC to LC Fibre Channel optical cable
X9724A	15-meter SC to LC Fibre Channel optical cable
X9735A	25-meter SC to LC Fibre Channel optical cable
X9737A	50-meter SC to LC Fibre Channel optical cable
X9739A	100-meter SC to SC Fibre Channel optical cable

Options

The table below lists options available for the Sun StorEdge 3511 Fibre Channel array with SATA.

Option Number	Description
XTA-3511-DC-Kit	DC power and cooling unit, 2U
XTA-ST1NC-250G7K	250-GB SATA, 7200-rpm drive module
XTA-3511-CTRL-1G	Hardware RAID controller FC, 1-GB memory, battery, 2U
X6767A	Single channel 2-Gb Fibre Channel PCI
X6768A	Dual channel 2-Gb Fibre Channel PCI
XTA-3000-2URK-19U	Rack kit, 2U, 19-inch cabinet, 22 to 28 inches
XTA-3000-2URK-19U	Rack kit, 2U, 19-inch cabinet, 28 to 36 inches (Use for Sun StorEdge cabinet/Sun Fire rack)

XTA-3000-2URK-19C	Rack kit, 2U, 19-inch cabinet Telco center mount
XTA-3000-2URK-19F	Rack kit, 2U, 19-inch cabinet Telco front mount
XSFP-SW-2GB	2-GB copper-to-optical short-wave
XSFP-LW-2GB	2-GB copper-to-optical long-wave

The following is a text representation of WEBDESK's GUI order flow for the Sun StorEdge 3511 Fibre Channel array with SATA.

Section 1: Configure Primary Array (required)

STEP 1: Number of FC-AL RAID Controllers

Select 0 Expansion, 1, or 2.

STEP 2: Storage Location

Select Rack Ready or Table Top.

STEP 3: Power Type

Select AC or DC.

STEP 4: Disk Type

Select 250-GB 7200 rpm disk drive.

STEP 5: Number of Disks per Array (total capacity)

Select any value from 5 to 12. 5-bay and 12-bay configurations come with drives factory installed.

Selecting values 6, 7, 8, 9, 10, or 11 yields extra drives shipped as X-options (field configurable).

STEP 6: Number of External FC I/O Connections

Select 1 or 2 for expansion, 1 to 4 for one RAID controller, or 1 to 8 for two RAID controllers. Each connection selected yields one FC cable. Cables are auto-inserted according to selected part number in Section 1, Step 7.

STEP 7: Preferred Cable(s)

Select one of the following cables. Up to eight are auto-inserted by the configurator. (Quantity depends on selection in Section 1, Step 6).

X9732A	2-meter LC to LC Fibre Channel optical cable
X9733A	5-meter LC to LC Fibre Channel optical cable
X9734A	15-meter LC to LC Fibre Channel optical cable
X9736A	25-meter LC to LC Fibre Channel optical cable
X9738A	50-meter LC to LC Fibre Channel optical cable
X9740A	100-meter LC to LC Fibre Channel optical cable
X9721A	0.4-meter SC to LC Fibre Channel optical cable
X9722A	2-meter SC to LC Fibre Channel optical cable
X9723A	5-meter SC to LC Fibre Channel optical cable
X9724A	15-meter SC to LC Fibre Channel optical cable
X9735A	25-meter SC to LC Fibre Channel optical cable
X9737A	50-meter SC to LC Fibre Channel optical cable

STEP 1: Number of Disks per Expansion Array (total capacity)

Select any value from 5 to 12. 5-bay and 12-bay configurations come with drives factory installed. Selecting values 6, 7, 8, 9, 10, or 11 yield extra drives shipped as X-options (field configurable).

STEP 2: Connect To

If you selected "0 Expansion array" under *Number FC-AL of RAID Controllers*, the only selection available is "Existing Expansion Array (Daisy Chained)."
If you selected "1" or "2" under *Number FC-AL of RAID Controllers*, select "RAID array (Direct)" or "Existing Expansion Array (Daisy Chained)."

Note: *Selecting "RAID array (Direct)" connects the expansion array directly to the RAID array, utilizing the on-board FC ports of this device. Selecting "Existing Expansion Array (Daisy Chained)" daisy-chains the expansion array to a device that has been connected directly to the RAID array. You may only select "Existing Expansion Array (Daisy Chained)" AFTER a direct connection to the RAID array has been configured.*

STEP 3: Preferred Cable(s) for Expansion Array(s)

Select one of the following cables. One cable is added for every "Existing Expansion Array (Daisy Chained)." One cable is added for every "RAID array (Direct)" when "1" RAID controller is selected. Two are added for every "RAID array (Direct)" when "2" RAID controllers are selected.

X9732A	2-meter LC to LC Fibre Channel optical cable
X9733A	5-meter LC to LC Fibre Channel optical cable
X9734A	15-meter LC to LC Fibre Channel optical cable
X9736A	25-meter LC to LC Fibre Channel optical cable
X9738A	50-meter LC to LC Fibre Channel optical cable
X9740A	100-meter LC to LC Fibre Channel optical cable
X9721A	0.4-meter SC to LC Fibre Channel optical cable
X9722A	2-meter SC to LC Fibre Channel optical cable
X9723A	5-meter SC to LC Fibre Channel optical cable
X9724A	15-meter SC to LC Fibre Channel optical cable
X9735A	25-meter SC to LC Fibre Channel optical cable
X9737A	50-meter SC to LC Fibre Channel optical cable
X9739A	100-meter SC to SC Fibre Channel optical cable

STEP 4: Add Expansion Arrays

Press the "Add" button. This add SAN expansion array to the configuration. Currently, one expansion array may be added to a "0 Expansion array" configuration, and two may be added to a "1" or "2" RAID controller configuration.

Note: *You may not change your selection in "Number of FC-AL RAID controllers" if expansion arrays exist in your configuration. You must delete all expansion arrays if you desire to modify this selection (See Step 5).*

STEP 5: Delete Expansion Arrays

If you make a mistake or simply wish to modify the configuration, select an expansion array from the "Configured Expansion Arrays" table and press the "Delete" button. This deletes the array from your configuration.

Select any of the following.

	No Rackmount kit
XTA-3000-2URK-19U	19-inch rackmount kit for 22 to 28-inch cabinets (use with Sun Rack 900)
XTA-3000-2URK-19U	19-inch rackmount kit for 28 to 36-inch cabinets (use with Sun StorEdge expansion cabinet and Sun Fire rack)
XTA-3000-2URK-19C	19-inch rackmount kit for Telco cabinets, center mount
XTA-3000-2URK-19F	19-inch rackmount kit for Telco cabinets, front mount

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Note: *Rack rails are not included with any Sun StorEdge 3511 Ship Kit.*

STEP 2: SFPs

Short-wave SFPs are auto-inserted when required. Long-wave SFPs are optional items.

A minimum pre-set quantity of short-wave SFPs for JBOD expansion, single RAID and dual RAID configurations are automatically included via the WEBDESK configurator. The WEBDESK configurator will add additional SFPs as need to complete the requested configuration.

The pre-set quantity of SFPs are:

- JBOD expansion unit includes two short-wave SFPs
- Single RAID controller includes four short-wave SFPs
- Dual RAID controller includes six short-wave SFPs

STEP 3: Power Cords

Two geo-specific power cords are added to each Sun StorEdge 3511 array configured.

X311L	Localized power cord kit, North American/Asian
X312L	Localized power cord kit, Continental European
X314L	Localized power cord kit, Swiss
X317L	Localized power cord kit, U.K.
X383L	Localized power cord kit, Danish
X384L	Localized power cord kit, Italian
X386L	Localized power cord kit, Australian

STEP 4: Add Host Bus Adapter

When configuring a single server and Sun StorEdge 3511 Fibre Channel array with SATA, select a minimum of one (X)6768A for every two external FC connections required, or one (X)6767A per external FC connection required. If you do not add sufficient options to meet this requirement, WEBDESK auto-inserts the required number of (X)6767 as the default card.

When configuring "Standalone Storage," you have several choices:

STEP1: Select "Add default HBAs." The configurator adds one X6767A for every external FC I/O connections required.

STEP 2: Select "Add custom HBAs." The configurator does not add any HBAs and you have the

option of selecting any type and quantity of HBAs that you would like (this configuration is NOT validated).
STEP 3: Select "No HBAs Required." The configurator does not add any HBAs.

Note: *Co-existence of a Sun StorEdge 3511 Fibre Channel array with SATA and any other storage device on the same host bus adapter is not allowed.*

Warranty, Service, and Support

Warranty

The Sun StorEdge™ 3511 Fibre Channel array comes with a 2-year warranty: 1st year, second business day, on-site. 2nd year, 15-day parts exchange.

Support Contracts

The SunSpectrum™ program is an innovative and flexible service offering that allows customers to choose the level of service best suited to their needs, ranging from mission-critical support for maximum solution availability to backup assistance for self-support customers. The SunSpectrum program provides a simple pricing structure in which a single fee covers support for an entire system, including related hardware and peripherals, the Solaris™ Operating Environment software, and telephone support for Sun™ software packages. The majority of Sun's customers today take advantage of the SunSpectrum program, underscoring the value that it represents. Customers should check with their local Sun Enterprise Services representatives for program and feature availability in their areas.

SunSpectrum program support contracts are available both during and after the warranty program. Customers may choose to uplift the service and support agreement to meet their business needs by purchasing a SunSpectrum contract.

The four levels of SunSpectrum support contracts are outlined below.

SunSpectrum Program Support

Program	Description
Mission-Critical SunSpectrum Platinum℠ Support	Designed to support client-server, mission critical solutions by focusing on failure prevention, rapid recovery and year round technical services planning. Support is provided 24 x 7.
Business-Critical SunSpectrum Gold℠ Support	Includes a complete package of proactive and responsive services for customers who require maximum uptime for their strategic business-critical systems. Support is provided 24 x 7.
System Coverage SunSpectrum Silver℠ Support	Combines the service expertise, responsive on-site support and technical support by telephone and SunSolve™ CD/on-line services. Support is provided 8 a.m. to 8 p.m. Mon. through Fri.
Self-Directed SunSpectrum Bronze℠ Support	Provided for customers who rely primarily upon their own in-house service capabilities. Allows customers to deliver high quality service by giving them access to UNIX® expertise, Sun certified replacement parts, software releases and technical tools. Support is provided 8 a.m. to 5 p.m. Mon. through Fri.

This service includes site preparation review, installation planning, installation, configuration verification, and system turnover for one Sun StorEdge 3511 Fibre Channel array with SATA. The specific tasks and deliverables included in this service are:

- Site preparation review including environmental states
- On-site installation planning including schedule and resources
- Development of System Installation Specification including RAID characteristics and recommendations

- Verify supported configuration and customer sign-off to start installation
- Installation of array hardware and cabling
- Installation of array software and patches
- Configuration and customization of the array including RAID levels and logical volumes
- Verification of installation and array functionality
- System turnover

Glossary

Bandwidth	A measure of the capacity of a communication channel, usually specified in MB/second.
Cache	Memory on the RAID controller card which permits intermediate storage of read and write data without physically reading/writing from/to the disk, which can increase overall performance under certain conditions.
CLI	Command line interface
Device name	Software device address that identifies the contoller/LUN, such as cXtYdZs0, where X is the host bus adapter, Y is the contoller, and Z is the LUN. S0 slice number is used by the system, not by RAID Manager.
Disk array	Two or more drives configured as a drive group (see next).
Drive group	A physical set of drives configured as an array. Drive groups are defined during configurtion.
Expansion drive array	An enclosure containing a group of drives, power supplies, cooling fans, I/O cards, and midplanes (no RAID controller/controllers); generally, an external drive array that is used to daisy-chain to an existing hardware-based RAID configuration.
Fast write	Allows disk write commands to be safely acknowledged to the host before the data is actually written to the disk media. This can be enable/disabled through the storage management software.
Full-duplex	Data transmission in both directions at the same time. See also Half-duplex and Simplex.
Half-duplex	Refers to an interface, such as FC, that can transmit data in only one direction at a time. See also Full-duplex and Simplex.
Host bus adapter	A card that connects a peripheral device to the computer system's I/O bus.
Hot plug	The ability to remove, replace, or add a device while current I/O processes continue.
Hot-serviceable	The ability to remove, replace or add a device while power is still applied but all I/O processes are suspended.
Hot-spare or hot-sparing	A drive in an array that is held in reserve to replace any other drive that fails. After reconstruction, the hot-spare drive is returned to the standby status.
Hot-swap or hot-swappable	A specific case of hot-plug which involves replacing a device with another of the same size, type, and layout, without any notification to the operating environment.
IOPS	Input/output operations per second. A measure of I/O performance, this is usually used to quote random I/O performance. See throughput.
LUN	Logical unit number. A LUN is a set of physical drives in a RAID configuration which are seen by the operating system as one virtual drive.
MTBF	Mean time between failures. A measure of reliability, this is the average expected time between failures of equipment, usually measured in operating hours.
MTBDL	Mean time between data loss. In a RAID system, this is the average expected time between two rapid disk failures that would cause irreparable data loss.

MTTR	Mean time to repair. A measure of availability, this is the average time the system is out of commission to complete a repair process.
Parity	Additional information stored along with the data that allows the controller to reconstruct lost data on RAID 3 or 5 LUNs if a single drive fails.
Reconstruction	Process used to restore a degraded RAID 1, 3, or 5 LUN to its original state after replacing a single failed drive.
RDAC	Redundant disk array controller. The RDAC driver is included in the RAID Manager software, and manages the rerouting of active I/O operations when a controller fails.
RAID	Redundant Array of Independent Disks. A RAID is a set of disk drives appearing as a single logical disk drive to a system host. Different RAID levels provide different capacity, performance, availability, and cost characteristics.
RAID controller drive array	An enclosure containing one or two RAID controllers, a group of drives,power supplies, cooling fans, I/O cards, and midplanes.
RAS	Reliability, availability, and serviceability. Features that enhance these attributes, including hot-pluggable capability and redundancy, are important for keeping mission-critical applications and data on-line.
SAF-TE	FC Accessed Fault-Tolerant Enclosures.
SCA	Single connector attachment. A FC disk connector technology co-invented by Sun Microsystems. The SCA provides all FC, power, and control signals in a single connector, and enables easy servicing and highly reliable,pluggable disk drives.
FC address	The octal representation of the unique address (0–7) assigned to a narrow device; or hex representation of the unique address (0–15) assigned to a wide FC device.
Simplex	Transmission in one preassigned direction only. See also Full-duplex and Half-duplex.
SNMP	Simple network management protocol. SNMP enables RAID events to be remotely monitored by designated network management stations.
Split channel	Inside the same drive array enclosure, when the drive channel is evenly divided into two separate channels; for example, when a 12-drive channel is cleaved into two independent channels
Striping	Spreading, or interleaving, logically contiguous blocks of data across multiple independent disk spindles. The amount of data written on each disk before moving to the next drive is the stripe width.
Throughput	A measure of sequential I/O performance, quoted in MB/sec. See IOPS.
Volume	In VERITAS Volume Manager software, a volume is a virtual disk partition into which a file system, DBMS, or other application can place data. A volume can physically be a single disk partition or multiple disk partitions on one or more physical disk drives. Applications that use volumes do not need to be aware of their underlying physical structure. The VERITAS Volume Manager software handles mapping of virtual partition addresses to physical addresses.
Warm plug	The ability to remove, replace or add a device while power is still applied but all I/O processes are suspended.
XOR	eXclusive OR. A binary mathematical operation performed on data to produce parity information. In RAID levels 3 and 5, parity is generated from the user data, stored, and used to regenerate lost data if a drive failure occurs.

Materials Abstract

Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
Product Literature				
– *Sun StorEdge™ 3511 Fibre Channel Arrays, Just the Facts*	Reference Guide (this document)	Sales Tool	SunWIN, Reseller Web	407094
– *Sun StorEdge 3511 Fibre Channel Array Customer Presentation*	Customer Presentation and Slide Notes	Sales Tool	SunWIN, Reseller Web	407095
– *Sun StorEdge 3511 Fibre Channel Array Data Sheet*	Two-page Color Data Sheet	Sales Tool	SunWIN, Reseller Web, COMAC	407084
– *Sun StorEdge 3511 Array Pocket Facts*	Quick Reference Card	Sales Tool	SunWIN, First Resort, Reseller Web	
– *Sun StorEdge Product Overview*	Sun Product Quick	Sales Tool	SunWIN, First	
External Web Sites – *Sun StorEdge Array Information Site – Additional Information – Upgrades Information*	http://www.sun.com/storage/ http://www.sun.com/products_n_solutions/hardware/docs http://www.sun.com/ibb			